Factors influencing recruitment, retention, and turnover of the dental practitioner workforce in Australian rural areas

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Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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Declaration of originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously publishes or written by any other person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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The research associated with this thesis abides by the international and Australian code on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Statement of co-authorship

This thesis includes papers for which Diana Godwin (DMG) was not the sole author. DMG was the lead in this research as she completed the data collection, analysed the data and wrote the manuscripts. However, she was assisted by the co-authors whose contributions are detailed below.

The following people and institutions contributed to the publication of work undertaken as part of this thesis:

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Supervisor 3 = C. Leigh Blizzard - Menzies Institute for Medical Research

Supervisor 4 = Erica Bell - Wicking Dementia Research and Education Centre

1. The paper reported in the **Prologue:**

Paper 1: Godwin, DM. Hoang, H. Blizzard, CL. Crocombe, LA. (2016). OPINION: An oversupply of dentists. What it means for the rural dental workforce. *Australian Dental Association News Bulletin*, No 454, June 2016, 46-47.

The contribution of each author:

DMG was the primary author and contributed 80% to the data collection, data management, data analysis, design of figures, and completing the first draft and revisions of the article.

HH, CLB and LAC helped with revisions of the article.

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DMG contributed approximately 70% of data collection, data management, data analysis, and completing the first draft of the manuscript. HH assisted with data analysis and interpretation of the results and revisions of the manuscript.

LAC helped with revisions of the manuscript.

EB helped with final revision of the manuscript.

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LAC helped with revisions of the manuscript.

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The contribution of each author:

DMG contributed approximately 60% data collection, data management, data analysis, and completing the first draft and revisions of the manuscript. With CLB, she undertook the data analysis, interpretation of the results, drafting the datasets, and revisions of the manuscript.

HH helped with revisions of the manuscript.

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HH helped with interpretation of the results, and revisions of the manuscript.

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The contribution of each author:

DMG was the primary author and contributed 80% of data collection, data management, and completing the first draft and revisions of the article.

HH, CLB and LAC helped with revisions of the article.

We the undersigned agree with the above stated "proportion of work undertaken" for each of the above published (or submitted) peer-reviewed manuscripts contributing to this thesis:

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Abstract

Dental practitioners provide important primary health care services through the provision of preventive and restorative dental services. Despite an increase in dental practitioner numbers in Australia and a current workforce oversupply, there is a mal-distribution between urban and rural areas, with the majority of dental practitioners working in major cities.

Rural populations experience poorer oral health outcomes than their metropolitan counterparts. One reason for this is that people in rural areas experience difficulties with access to dental health care compared with people in metropolitan areas.

Health workforce shortages have negative health effects on rural populations. The successful recruitment and retention of health practitioners is a common problem faced in rural areas across the Western world. Turnover is higher in rural than in urban areas because dental practitioners often leave rural areas and move to more urban areas for a range of social and professional reasons. These reasons include geographical isolation, and difficulties for their families to access services, which are less often issues in larger metropolitan areas. This turnover creates a 'churn' of more experienced dental practitioners moving away from rural to urban areas creating a skills shortage in rural areas that can result in poorer oral health outcomes for rural populations. These workforce shortages are having negative effects on already disadvantaged rural populations and should be addressed. While some dental practitioners choose to work in rural areas, we need to better understand the reasons why they do and why many others chose not to do so. This information is critical when developing strategies to encourage more practitioner to practice in rural areas.

This thesis aimed to (1) identify the attitudes of Australian dental practitioners towards living and working in Australian rural areas, (2) identify the factors that influence the rural recruitment and retention of Australian dental practitioners, (3) investigate whether dental practitioners who themselves have a rural background were more likely to practice in rural areas, than those who do not have a rural background and if so, investigate whether this rural background effect differs between female and male dental practitioners.

A conceptual framework and a systematic literature review were developed to guide the study. The study employed a mixed methods design with semi-structured interviews and a self-administered online survey of dental practitioners Australia-wide as data collection methods. Through collaboration and advertisements with the four major Australian dental professional associations, semi-structured interviews were conducted with 50 dental practitioners and 631 online surveys were completed using LimeSurvey software. The interview data were analysed using content and thematic analysis with the use of NVivo 10.0. The survey data were analysed using Poisson regression with robust standard errors and ordinal log multinomial regression with SPSS 22 and STATA 14.

Four key themes were identified from the analyses of the interviews and surveys as being important for rural recruitment, retention, and turnover of dental practitioners in Australia:

(i) Business Case: The dental practitioners expressed concerns about perceived difficulties in achieving a sustainable income when operating a dental practice in a rural area. These concerns were due to smaller population sizes, average lower incomes of clients in rural areas, and their tendency not to seek regular dental treatment. The most important factor influencing rural practice recruitment decisions was whether or not operating private dental practice in a rural area would provide financial security. Financial issues were associated with rural practice decisions for men, in particular.

(ii) Differences in Clinical Practices: There are differences in clinical practices between urban and rural areas that can influence rural practice decisions. Rural dental practitioners more often treat patients seeking emergency pain relief, whereas routine preventative treatment is a feature of urban practice. Rural practitioners were less concerned about these differences than urban practitioners. Women practicing in rural areas were additionally less concerned with work structures and workplace relations than women in urban practice.

(iii) Community: The community plays an important role in facilitating recruitment and retention of dental practitioners in rural practice. Perceptions of dental practitioners about what it would be like to live in rural areas shape their willingness to practice in rural areas. Those who chose to do so professed having a sense of belonging to their community, a belief that they

are valued by members of their community and have an affection for their community. There are heightened social expectations of dental practitioners who live and work in rural areas that may discourage some from doing so. For women who practice in rural areas, affordability of housing and lack of community was of lesser concern than those in urban practice.

(iv) Individual Factors: Participants described their personal backgrounds and how they felt it had shaped their practice location decision. Individual factors such as where they grew up, their family needs, and expectations of quality of life played an important role in dental practitioners' decisions about working in rural areas. In particular dental practitioners with rural backgrounds were more than twice as likely to work in rural practice as their urban background counterparts. Lifestyle preferences, stage of life, and family structure and circumstances influence recruitment and retention. Particularly for women, rural practitioners were less concerned about being close to extended family than their urban practice counterparts.

This thesis provides important recommendations for the provision of rural dental care services to address the factors influencing work location for rural dental practitioners. Due to the high fixed costs of operating a dental practice, many rural and remote communities have population sizes that are too small for a privately operated dental practice to be financially viable. Private dental practitioners could be encouraged to treat public patients in rural areas, and this could be funded by the public sector. In very isolated and remote areas, where a fixed private dental practice is not financially viable due to the low population; physicians, nurses, Aboriginal health workers and pharmacists could be trained to provide dental screening. They could also be taught to understand which oral conditions require urgent dentist or dental specialist referral, and which can be treated by antibiotics or minimally invasive dental techniques.

Australian dental schools, both located in urban and rural areas could be encouraged to increase their proportion of students with a rural background. A particular target could be women with a rural background, because evidence in this thesis indicates that they are more likely than their male rural background counterparts to practice in rural areas. Exposure to rural clinical work prior to entering the workforce could be provided to promote rural workforce choices by dental practitioners because those with a rural background and understanding of rural practice were more likely to practice in rural areas. Increased promotion and exposure to rural practice during

undergraduate training through rural work experience and community integration could also be encouraged for all undergraduate students in all dental schools.

In addition, effective and efficient referral pathways and communication pathways between dentists, GPs, and all health care service providers in rural areas could be promoted. Rural professional support networks could be improved to provide mentoring and supervision for newer graduates. The professional dental associations and CPD providers have an important role to play in building these networks. Using methods such as phone help services, online help, tele-dental and e-dental services, and electronic network communities.

In summary, this study makes an important contribution to the body of knowledge about the influences on rural practice decisions of Australian dental practitioners. The key findings are important because they provide guidance to policy makers responsible for designing strategies to ensure the correct number of dental practitioners are working in rural areas and to stabilise workforce turnover in the rural dental workforce that best meets the needs and demand for dental care.

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My secondary supervisor Dr Ha Hoang. She is my career inspiration; she is the person that I want to be when I grow up. Like me, she manages a young family as well as a successful academic career, but unlike me, she seems to do it with ease. I have learned a great deal from her expertise with my ethics application, and qualitative research skills. She was always the first person I sent any drafts to, the first person I called when I had a question about my project, and somehow always had the answer. She guided me through the process of conducting high-level research and writing my thesis, and seemed to always magically have the relevant scientific article I was looking for! Her research skills are impressive far beyond the normal for someone at the beginning of their academic career. Her watchful eye brought together my thesis, and kept me on track to actually finish it.

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Contents

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Abbreviations

ACT: Australian Capital Territory

ADA: Australian Dental Association

ADP: Allied dental practitioner

ADOHTA: Australian Dental and Oral Health Therapists' Association Inc.

ADPA: Australian Dental Prosthetists Association

ARCPOH: Australian Research Centre for Population Oral Health

CI: Confidence interval

CPD: Continuing professional development

DHAA: Dental Hygienists Association of Australia

NT: Northern Territory

OECD: The Organisation for Economic Co-operation and Development

OHT: Grouping of dental hygienists, dental therapists, and oral health therapists

PR: Prevalence ratio

PRE: Prior rural exposure

QLD: Queensland

RBE: Rural background effect

RQ: Research question

SA: South Australia

TAS: Tasmania

VIC: Victoria

WA: Western Australia

Achievements from the work described in this thesis:

1.1 Publications directly arising from the work described in this thesis

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Godwin DM. Hoang H, Crocombe L, Bell E. (2013). Dental practitioner rural work movements: A systematic review. In: 2013 *Primary Health Care Research Conference: Program & Abstracts.* Primary Health Care Research and Information Service, Australia. [Abstract]

Godwin, M. Hoang, H. Crocombe, L. A. and Bell, E. (2014). Dental practitioner rural work movements: a systematic review. *Rural Remote Health*, 14(3), 2825.

Godwin, D. Hoang, H. and Crocombe, L. (2016). Views of Australian dental practitioners towards rural recruitment and retention: a descriptive study. *BMC Oral Health*, 16, 1-10.

Godwin, DM. Hoang, H. Blizzard, CL. and Crocombe, LA. (2016). An oversupply of dentists, what it means for the rural dental workforce. *Australian Dental Association News Bulletin*, June 2016, 46-47.

Godwin, DM. Hoang, H. Blizzard, CL. and Crocombe, LA. (2016). Dental Relocation and Infrastructure Support Scheme: Improvements. *Australian Dental Association News Bulletin*, June 2016, 38-40.

Godwin, D. Blizzard, L. Hoang, H. and Crocombe, L. (2016). Evidence of the effect of rural background on rural practise in Australian dental practitioners: does gender play a role? *Australian Dental Journal*, 62(1), 30-38. DOI:10.1111/adj.12442.

Godwin, D. Blizzard, L. Hoang, H. and Crocombe, L. (2016). Factors influencing Australian dental practitioners' decisions on rural practice recruitment, retention and turnover, *Australian Journal of Rural Health* [This article has been submitted to the Australian Journal of Rural Health for publication on the 12th October 2016]

1.2 Conference presentations using the work described in this thesis

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Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Dental practitioners' rural work movements: a systematic review. The Tasmanian Health Science Higher Degree by Research (HDR) student conference, 1st July 2013, Medical Sciences Precinct, Hobart, Tasmania. Poster presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Dental practitioner rural work movements: A systematic review. 2013 Primary Health Care (PHC) Research Conference: Program & Abstracts. 10-12 July 2013, the Hilton, Sydney, New South Wales. [Refereed Conference Paper], Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Dental practitioner rural work movements: a research proposal. Rural Health Graduate Research Symposium, 21st November 2013, Hotel Grand Chancellor, Hobart, Tasmania. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Factors in recruiting and retaining dental health practitioners to rural and remote areas in Australia: a qualitative study. 2nd International Primary Health Care Reform Conference (IPHCRC), 17th – 19th March 2014, Brisbane, Queensland. Poster presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Why dental practitioners do and don't practice in rural areas in Australia: A qualitative study. 6th International Meeting on Methods in Oral Health Research (The Dental-Biostats Conference), 1-3rd April 2014, Adelaide, South Australia. Oral presentation

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Recruiting and retaining dental practitioners to rural practice in Australia: a qualitative study. Health Service Improvement Research Seminar, 7th May 2014, Hobart, Tasmania. Oral presentation

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Factors in recruiting and retaining dental health practitioners to rural and remote areas in Australia: a qualitative study. The Tasmanian

Health Science HDR student conference, 28th July 2014, Medical Sciences Precinct, Hobart, Tasmania. Poster presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Recruiting and retaining dental practitioners to rural practice in Australia. Rural Health Workforce Australia (RHWA) Dental Research Exchange, 27th November 2014, Melbourne, Victoria. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Recruitment and Retention of Dental Practitioners in Rural Australia: views of dental practitioners. Population Health Congress, 6 - 9 September 2015, Hotel Grand Chancellor, Hobart, Australia. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Blizzard, CL. Why don't dental practitioners work in rural areas? Rural Health Research Symposium, 26 - 27 April 2016, Rural Clinical School, Burnie, Australia. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Blizzard, CL. Factors influencing the Australian rural dental workforce. Tasmanian Health Research Student Conference, 4th July 2016, Medical Science Precinct, Hobart, Australia. Oral presentation.

Godwin, DM. Blizzard, CL. Hoang, H. and Crocombe, LA. Evidence of the rural background effect (RBE) in Australian dental practitioners. Tasmanian Health Research Student Conference, 4th July 2016, Medical Science Precinct, Hobart, Australia. Poster presentation.

Godwin, DM. Hoang, H. Crocombe, L. A. and Blizzard, CL. Factors influencing the Australian rural dental workforce. Three Minute Thesis Semi-final, 21st July 2016, Tasmanian College of the Arts, Hobart, Australia. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, L. A. and Blizzard, CL. Key factors that influence the Australian rural dental workforce. Lightning Talk, 5th Rural and Remote Health Scientific Symposium, 6-7th September 2016, Old Parliament House, Canberra. Oral presentation.

Godwin, DM. Hoang, H. Crocombe, LA. and Blizzard, CL. The key factors that can influence the Australian dental workforce to rural practice. The Dental Hygienists' Association of

Australia Ltd (DHAA), 2016 National Symposium, 10-12th November 2016, MONA & the Hotel Grand Chancellor, Hobart. Oral presentation.

1.3 Invited talks and paper reviews

Invitation and travel grant to attend and speak at the Rural Health Workforce Australia (RHWA) Dental Research Exchange, 27th November 2014, Melbourne, Victoria.

Godwin, DM. Hoang, H. Crocombe, LA. and Bell, E. Recruiting and retaining dental practitioners to rural practice in Australia. Rural Health Workforce Australia (RHWA) Dental Research Exchange, 27th November 2014, Melbourne, Victoria. Oral presentation.

Invitation to provide expert comment and review a draft of The Royal Flying Doctor Service (RFDS) evidence based discussion paper focused on the oral health of remote and rural Australians.

Bishop, L.M. and Laverty, M.J. (2015). Filling the gap: Disparities in oral health access and outcomes between metropolitan, and remote and rural Australia. Canberra: Royal Flying Doctor Service of Australia.

Competitor in the University of Queensland 3 Minute Thesis, Health Sciences competition.

Godwin, DM. Hoang, H. Crocombe, LA. and Blizzard CL. 3MT: Factors influencing the Australian rural dental workforce. 3 Minute Thesis Competition, 4th July 2016, Medical Science Precinct, Hobart, Australia. 3MT Oral presentation. Progressed through to mixed-disciplinary finals at the University of Tasmania. 3MT Semi-finals, held 21st July 2016, Tasmanian College of the Arts, Hobart, Australia.

Invited speaker at the 2016 Dental Hygienist Association of Australia (DHAA) National Symposium held in Tasmania.

Godwin, DM. Hoang, H. Crocombe, LA. and Blizzard, CL. The key factors that can influence the Australian dental workforce to rural practice. The Dental Hygienists' Association of Australia Ltd (DHAA), 2016 National Symposium, 10-12th November 2016, MONA & the Hotel Grand Chancellor, Hobart. Oral presentation.

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1 BACKGROUND AND INTRODUCTION

1.6 Preface

The prologue presented an overview of the current state of the dentist workforce in Australia. This chapter will present a background and introduction to the study investigating the attitudes of Australian dental practitioners towards living and working in Australian rural areas.

1.7 Introduction

This chapter describes the overall picture of the thesis. Firstly, it will provide the background, providing a foundation of the rationale for undertaking the research project, and putting the research topic into context. Following this is an outline of the research objectives for the project within the contextual framework of the thesis and a description of the methodology used. Finally, the structure of the thesis is outlined and descriptions of each chapter are provided.

1.8 Research Background

> *"Oral health is fundamental to overall health, wellbeing and quality of life. A healthy mouth enables people to eat, speak and socialise without pain, discomfort or embarrassment" (COAG Health Council 2015: xi)*

The purpose of this study was to investigate the attitudes and opinions of Australian registered dental practitioners towards living and working in rural areas given that there is a mal-distribution of the workforce with an oversupply in urban areas and shortages in rural areas. Based on the findings of this study, this research may provide important policy recommendations and improvement strategies to the Australian Government's existing Commonwealth rural dental workforce policies to address this mal-distribution, with the aim of increasing the dental workforce in rural areas.

1.8.1 Research rationale

> *"In a country as wealthy as Australia everyone should be able to access dental care." (The National Rural Health Alliance Inc. 2013)*

The topic of access to dental health services in rural was of interest to the researcher for some time due to her extensive experience in clinical dental care services in Tasmania. Prior to undertaking work on this thesis, the researcher worked in the public sector in oral health services. There she witnessed firsthand the high workforce turnover of dental practitioners from a range of different backgrounds, and the difficulties that people in rural Tasmania faced in accessing oral health care services. The dental practitioners she engaged with each had a different reason for coming to work in Tasmania, saw Tasmania in different ways (some thought it was rural, very isolated, and very small), and they left or stayed for a variety of different reasons. Upon further investigation, she discovered that there were reoccurring themes that influence workforce decisions and practice movement's that dental practitioners make, and most importantly, that Tasmania was not alone in facing high workforce turnover. This issue was not simply a dental workforce one, nor was it only a Tasmanian one.

The researcher discovered that the unequal distribution of health practitioners between urban and rural areas in OECD countries is a globally observed phenomenon (Ricketts 2005); and the increased difficulties with recruitment and retention, and higher workforce turnover of rural health practitioners is a common problem faced by rural areas (Schoo, Stagnitti et al. 2005). Through her clinical work engaging with dental practitioners from around the globe, the researcher understood that the decisions that health practitioners face about where to work, how long to remain in a particular practice area, and under what circumstances were highly complex. Work location considerations and decisions often began prior to completing undergraduate training and continued throughout after entering the workforce. Rarely were workplace decisions made for the last time at a single instance; there were many life stage factors that could influence work practice decisions. Some dental practitioners were willing to consider working in a rural area, while others had never considered the possibility and would not wish to. Their career length decisions on where to work depended on the possibilities they saw of

fulfilling career and personal aspirations and their ever-changing individual and family circumstances.

1.8.2 Theoretical background

Urban/rural maldistribution of the health workforce is a major concern in both developed and developing countries (Zurn, Dal Poz et al. 2004). In Australia, and across the world, the recruitment, training, support and retention of the rural health workforce is a longstanding and continuing problem (Veitch and Battye 2008). This is not a new issue, it is highly complex, and encompasses a range of situations. There are various approaches to defining workforce imbalances and skills shortages (Cohen and Zaidi 2002) and the labour market supply and demand for certain occupations and skills continuously fluctuate (Zurn, Dal Poz et al. 2004). The determination of what is a dental practitioner workforce shortage is therefore relative. Shortages can be based on either a value judgement - how much dental care should people receive? Alternatively, a professional determination - what is the desired number of dental practitioners for the general population? (Zurn, Dal Poz et al. 2004).

Australia is geographically large, has an uneven wealth distribution, and one of the most uneven population distributions in the world (Tennant, Kruger et al. 2013). The majority of Australian research and policy initiatives to address this issue have been based on simple statistical analysis (Australian Institute of Health and Welfare 2014). The use of simplified statistics for determining workforce shortages fail to account for the different cultural, social and economic drivers in rural populations, which may influence levels of dental care utilisation (Tennant, Kruger et al. 2013). The concept of remoteness is also an important dimension of policy development in Australia (Hugo 2002, Australian Government Department of Health and Ageing 2012).

1.8.3 Contextual background

In 2005, it was projected that there would be a dental workforce shortage in Australia by 2020 (AIHW 2008). Australia's Future Health Workforce, Oral Health (AFHW – Oral Health) provided oral health workforce planning projections; the 2012-2025 workforce projection scenario results for dental practitioners other than dental prosthetists indicated that supply was

projected to exceed demand in almost all scenarios (Health Workforce Australia 2014). In contrast, the results for dental prosthetists indicated that demand was projected to exceed supply in almost all scenarios (Health Workforce Australia 2014). These scenarios plotted workforce supply projections to meet the current demand for dental care, not the need for dental care. The demand for dental care would be expected to increase if the Australian Government increased funding for dental care. Australia-wide, there are less dental practitioners by population in rural than metropolitan areas, and this mal-distribution increases the more remote the region (*Table 1*).

Table 1-1: Dental practitioners, by remoteness area (a), FTE per 100,000 population

Practitioner type	Major cities	Inner regional	Outer regional	Remote/very remote	Australia
Dentist	64.3	42.2	36.1	21.5	56.9
Hygienist	5.8	2.7	2.8	1.7	4.9
Therapist	3.4	4.3	5.6	4.5	3.8
Oral health therapist	2.6	2.8	2.6	1.4	2.6
Prosthetist	5.6	6.4	3.2	0.5	5.4

It is evident from the national statistics (Dental Board of Australia 2015) and the HWA Dental Workforce Projections (Health Workforce Australia 2014) that that there is now an oversupply of dental practitioners in Australia, but with the majority working in major cities and ongoing workforce shortages in rural areas. These low dental practitioner numbers per size of the local populations of many rural areas has occurred despite an increase in the number of dental schools, skilled dental migrants entering Australia, and new Australian dental graduate numbers.

Dental practitioners provide important primary health care services through the provision of preventive and restorative dental services. Oral health is integral to overall general health, and poor oral health can have negative effects on general health and quality of life (Petersen 2003). This is particularly important for people residing outside the capital cities, as they have poorer oral health than their city counterparts (Crocombe, Stewart et al. 2010). Research identifies several groups in Australia who have poor oral health: frail and older people (Chalmers, Carter et al. 2002), rural residents (Crocombe, Stewart et al. 2010, Crocombe, Stewart et al. 2012, Crocombe, Mahoney et al. 2013, Crocombe, Bell and Barnett 2014), Indigenous Australians (Slack-Smith, Read et al. 2011), Australians with physical and intellectual disabilities (Pradhan

A, Slade GD et al. 2009), and people of low socio-economic status (Chrisopoulos, Luzzi et al. 2013).

1.8.3.1 Population distribution

The population distribution of Australia is concentrated in urban centres, approximately 90% of the Australian population live in major cities and inner regional areas (Phillips 2005). The remaining 10% of the population live in rural and remote areas, scattered across the country (Australian Bureau of Statistics 2013). Australian rural areas are diverse geographically, economically and socially, and have higher rates of poverty than in capital cities. Rural location can play a major role in determining the nature and level of access to and provision of oral health and other health services (Smith, Humphreys et al. 2008).

1.8.3.2 Provision of dental treatment in Australia

There are some similarities between the Australian rural medical workforce and the rural dental workforce, there are, however, several key differences. Dental treatment is provided and paid for differently to medical care in Australia, the latter being mainly government subsidised through Medicare. In Australia, dental services are largely provided by the private sector (85%) (Kruger and Tennant 2015), and the burden of payment falls to the individual, so that the cost of treatment is a common reason for people to avoid dental treatment (Harford, Ellershaw et al. 2011). Private health insurance covering dental treatment can also affect use of dental services (Chrisopoulos, Beckwith et al. 2011).

In rural areas when dental health services are not available, people visit non-dental health providers (Walker, Tennant et al. 2013); such as GPs for short term pain relief, prescriptions, hospitalisation, and advice (Barnett, Hoang et al. 2016). A private dental practice operates as a small business, and a dental practice requires a larger patient base than a medical practice to be financially viable resulting in the many widely-dispersed rural areas in Australia not having the population size needed to support a full-time private dental practitioner (Barnett, Hoang et al. 2015).

1.8.3.3 Rural health disparities

Rural health is a challenging and complex discipline because there is an urban/rural dimension in accessing health care (Schwarz 2006). Australia's rural populations have poorer overall general health than metropolitan populations (AIHW 1998, Smith, Humphreys et al. 2008). The reasons for this include: rural populations having a differing attitude towards health than urban populations (Humphreys, Jones et al. 2002, Crocombe, Stewart et al. 2012), people in rural areas commonly describe health as an absence of disease (Humphreys, Jones et al. 2002), and rural people are more likely to spend money on disease management rather than on primary care. Despite these factors, there remains geographic inequalities in access to dental care in Australia (AIHW 1999). Rural populations also experience socio-economic disadvantage, ethnicity, poorer service availability, higher levels of personal risk and more hazardous environmental, occupational and transportation conditions (Smith, Humphreys et al. 2008, Crocombe, Stewart et al. 2010) than urban populations.

1.8.3.4 Difficulties in accessing dental health services

The lack of oral health services and the greater distances involved in seeking treatment present a barrier to accessing regular dental care for rural populations (AIHW 1999). Rural people face difficulties in accessing dental health care services due to increased travel distances to services, smaller population sizes, and higher workforce turnover relative to metropolitan areas (Wakerman, Humphreys et al. 2008). However, while access to dental health services is a key reason why people outside capital cities have poorer oral health than people living in capital cities, it is not the only reason (Crocombe, Stewart et al. 2012). Living in a rural area does not always lead to health disparities, but it may exacerbate the effects of socio-economic disadvantage, poorer availability of health care services, poorer physical and financial access to services, increased waiting times for services, increased issues with transport, average lower levels of income and education, and higher occupational and environmental risk factors (Phillips 2009, Schwarz 2006, Smith, Humphreys et al. 2008).

1.8.3.5 Dental visitation patterns

There are differences in dental visitation patterns between urban and rural areas because geographic location is a major factor in the frequency of use of dental services and the reasons for dental visits (Adams, Slack-Smith et al. 2004). Rural populations have less frequent visitation patterns than urban populations. They are less likely to regularly visit a dental appointment for routine preventative treatment and are more likely to visit for a problem (AIHW 1999). Seeking dental treatment for a problem rather than a routine check-up may reflect the ability to access dental services in terms of availability and affordability (AIHW 1999). These factors can have a compounding effect because some of the most socio-economically disadvantaged rural areas are also the most geographically isolated from health services. This can increase the risks for rural populations of poorer oral health outcomes.

Dr Rick Olive, President of the Australian Dental Association (ADA), has highlighted some of the difficulties in providing dental care services to rural communities due to these visitation patterns.

> *"A higher proportion of patients from these communities place a low priority on oral health." (Dr Rick Olive, President of the Australian Dental Association (ADA), 2016)*

1.8.3.6 Dental workforce

In Australia, there has been an increase in the number of new dentists entering the workforce per year; there were 200 new graduate dentists and 50 from overseas in 2008 and 581 new graduates and 230 from overseas in 2013 (Griffiths 2014). This has been reflected by the removal of dentists from the Skilled Occupation List (SOL) (Department of Immigration and Border Protection 2016); the list of occupations that are acceptable for immigration to Australia. Analysis of recent dental workforce data (Dental Board of Australia 2015) indicated that there are also demographic changes occurring in the makeup of the dental practitioner workforce in Australia including the increasing proportion of female dental practitioners. As dental practitioner numbers increase, the issue of rural dental workforce recruitment may be solving itself, as people unable to find employment in urban areas relocate to rural areas. This may lead to increased workforce turnover and skills shortages in rural areas.

1.9 Research Justification

This research will contribute to new knowledge by providing useful insights into the attitudes of Australian dental practitioners towards rural practice and to reduce the dental workforce maldistribution between urban and rural areas by improving policies and initiatives aimed at removing barriers to rural practice. Understanding the attitudes that dental practitioners hold in relation to rural practice, could enable the barriers and predictors of rural practice to inform future policies and initiatives that reflect the needs of the rural workforce and the rural area. This could enable better access to oral health care services for rural populations.

1.10 Research aims and objectives

The aim of this thesis was to better understand the factors that may influence rural recruitment, retention, and turnover in the Australian dental workforce, so that access to dental care services can be improved for rural populations. This study may provide useful and insightful information for policy makers and other stakeholders on rural dental practice provision and utilisation to improve dental care access for rural populations in Australia.

1.10.1 Aims

To achieve the objectives of the study, the following aims have been identified:

- (RQ1) What are the attitudes of Australian dental practitioners towards living and working in Australian rural areas?

- (RQ2) What are the factors that influence the rural recruitment, retention, and turnover of Australian dental practitioners?

The findings from these aims were used to develop a research hypothesis.

1.10.2 Hypothesis

- (H1) (a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so this will be more pronounced for female dental practitioners than for male dental practitioners.

The hypothesis will test for evidence of a widely assumed, yet previously unproven assumption derived from the rural medical workforce: evidence of the RBE (Rural Background Effect) in Australian dental practitioners.

1.11 Methodology overview

The project used a mixed methods approach, utilising a combination of exploratory qualitative research and explanatory quantitative research. Beginning with an information and data gathering stage, a systematic literature review was conducted to identify what was previously known on the subject. Then, the qualitative approach gathered information through semi-structured interviews. Following this, the quantitative approach tested the key finding from the interviews using an online survey.

This thesis used an exploratory design: taxonomy development model, with interviews conducted first, followed by a survey. The study took place Australia-wide, with dentists (including dental specialists), dental prosthetists, dental hygienists, dental therapists, and oral health therapists.

Interviews were conducted over the phone between November 2013 and March 2014 with dental practitioners who had or did not have experience working in rural practice. Fifty participants were recruited through an advertising campaign with the professional dental associations. The interview guide was developed using findings from the systematic literature review and discussion among the research team to further investigate knowledge gaps in the existing literature. The interviews were divided into three parts: (i) participant background and training information, (ii) participant views/experiences of why they would or would not practice in a rural area, and (iii) participant views on strategies to recruit and retain rural dental practitioners.

The survey data were collected using a self-administered online cross-sectional survey of dental practitioners. Recruitment was also promoted by an advertising campaign through the Australian professional dental associations. The estimates of power were based on data collected in the interviews, and it was estimated that a sample of 500 dental practitioners would provide 96% power. The survey held 21 questions divided into five sections: background,

recruitment, retention, turnover, and further comments. Prevalence and prevalence ratios with 95% confidence intervals comparing demographic characteristics of participants were estimated using Poisson regression with robust standard errors. Ordinal log multinomial regression using a forwards-descending adjacent categories model was used to estimate association of rural practice with five ordered levels of respondent ratings of the importance potentially influencing recruitment, retention, and turnover of dental practitioners in Australian rural areas. Each section contains distinct chapters for ease of reading, some of which are peer-reviewed published academic articles, with supplementary data analysis and results provided at the end.

1.12 Structure of the thesis

This thesis is divided into chapters. This section provides an overview of each chapter.

- **Prologue** – A background to the status of the dentist workforce in Australia, published in the *Australian Dental Association News Bulletin.*

- **Chapter 1** – Background and Introduction: provides the aims and hypotheses of the thesis, as well as the research objectives, background information, and structure of the thesis.

- **Chapter 2** – Dental Practitioners Rural Work Movements: a Systematic Review: systematically and critically reviews the existing literature relevant to the study's topic and the issues outlined. This chapter was published in *Rural and Remote Health.*

- **Chapter 3** – Research Methodology: outlines and describes the conceptual framework and design of the research. This chapter discusses the research, data collection, and data analysis methods.

- **Chapter 4** – Views of Australian dental practitioners towards rural recruitment and retention: a descriptive study: This chapter was published in *BMC Oral Health*, and provides an overview and discussion on the findings from the interviews.

- **Chapter 5** – Factors influencing Australian dental practitioners' decision on rural practice recruitment, retention and turnover: This chapter was submitted for publication

to the *Australian Journal of Rural Health*, it investigates the factors that influence dental practitioners to work in rural areas

- **Chapter 6** – Evidence of the effect of rural background on rural practise in Australian dental practitioners: does gender play a role? This chapter was published in the *Australian Dental Journal*; it provides evidence and discussion of the rural background effect in dental practitioners.

- **Chapter 7** – Supplementary qualitative and quantitative results: reports additional results from the interviews and survey that were not previously published.

- **Chapter 8** - Discussion: provides the combined findings from the qualitative and quantitative data analysis, through interpretation and theory.

- **Chapter 9** – Improvements for the DRISS: outlines issues and suggests improvements for the *Dental Relocation and Infrastructure Support Scheme*. This chapter was published in the *Australian Dental Association News Bulletin.*

- **Chapter 10** – Summary and conclusions: presents the final remarks of the thesis. This chapter sums up the significance of the study, the main findings, strategic suggestions for dental services access improvement, future research needs, and the strengths and limitations of the study.

1.13 Conclusion

This chapter has presented an overview of the thesis. The chapter started with the statement of purpose of the study which is to identify the attitudes of Australian dental practitioners towards living and working in rural areas, with the aim of better understand and address the key factors which influence rural recruitment, retention, and turnover.

1.14 Postscript

This chapter presented an introduction and background to the thesis. Following with a statement of purpose, which was to investigate the factors that influence rural practice of dental

practitioners in Australia. The next chapter will outline the literature relevant to rural dental workforce issues, in Australia and overseas from 1990 and June 2013.

2 DENTAL PRACTITIONER RURAL WORK MOVEMENTS: A SYSTEMATIC REVIEW

2.1 Preface

In the previous chapter, I presented an introduction to the study. Introduced the theoretical and contextual background, described the aims and objectives of the study, and provided an outline of the structure of the thesis. In this chapter, I will present and discuss the literature relevant to the recruitment and retention of dental practitioners in rural areas.

All of the research contained within this chapter has been published as ***Godwin, D.M.*** *Hoang, H. Crocombe, L. A. and Bell, E. (2014). Dental practitioner rural work movements: a systematic review. Rural and Remote Health , 14(3), 2825.*

2.2 Introduction

There is a globally observed unequal distribution of health practitioners between urban and rural areas in OECD countries (Laven, Laurence et al. 2005, Ricketts 2005, Renner, Westfall et al. 2010). Recruitment and retention of health practitioners is a common problem faced by rural communities (Schoo, Stagnitti et al. 2005). Dental practitioners such as dentists, dental therapists, dental hygienists, oral health therapists and dental prosthetists/dental technicians provide important primary health care services to rural populations. Workforce shortages and stability issues in underserved areas can have negative effects on rural communities. Successful recruitment initiatives and long-term retention schemes for rural dental practitioners are important to improve the oral health of people in underserved areas (Powell, Hollis et al. 2006).

The problems associated with workforce stability of dental practitioners reflected those outlined in other health disciplines (Kruger and Tennant 2005, Wilson, Couper et al. 2009). It appears that despite government intervention, the forces that attract and retain health care providers in metropolitan areas and the incentives from working there are unable to be matched by smaller communities (Kruger and Tennant 2005). Rural communities share some characteristics that can negatively affect the manner in which health care is provided (Kruger and Tennant 2010)

and rural populations attend dental services less frequently than urban populations (Silva, Phung et al. 2006). These characteristics can include increased geographic distances for travel between population centres and oral health services (Skillman, Doescher et al. 2010). Population size can be limited so that effective care facilities are unsustainable, recruitment and retention schemes can be inefficient, management structures ineffective, and the possibly higher proportion of elderly, socioeconomically disadvantaged and indigenous peoples and geographical isolation can combine to further disadvantage rural health care provision (Humphreys, Wakerman et al. 2006, Hall, Garnett et al. 2007, Kruger and Tennant 2010).

There is much existing literature investigating current recruitment and retention initiatives and the factors which influence medical personnel to move to and work in rural areas, despite the fact that rural health services generally encompass a variety of health disciplines (Skillman, Doescher et al. 2010). It is important to understand the characteristics of dental practitioner mobility and the factors which can influence recruitment and retention of practitioners in order to maintain a stable healthcare system (Kruger and Tennant 2004, Gallagher, Clarke et al. 2007). Thus, a systematic review was needed to better understand and synthesise the available evidence of the factors which influence dental practitioners' decisions to work and stay working in rural areas and the strategies engaged to facilitate recruitment and retention of the rural oral health workforce. The objective of this review was to increase understanding of dental practitioner workforce regional maldistribution, with focus on Australia. This review synthesised the available evidence on the recruitment and retention of the dental practitioner workforce in rural and remote areas.

2.3 Methods

2.3.1 Review questions

1. What are the factors influencing dental practitioners' decisions to come to, stay and leave rural and remote areas?

2. What are the existing strategies for recruitment and retention of dental practitioners in rural and remote areas?

2.3.2 Search strategy:

Literature was searched independently by two reviewers to find papers related to recruitment and retention factors of dental practitioners in rural areas. While the study had primary focus on Australia, it included relevant international literature for background context. Data bases used were PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Informit, Web of Science, Scopus and Summon.

2.3.3 Keywords

The key words/phrases used in the search included combinations of the following: dentist, dental practitioner, dental professional, dental therapist, dental hygienist, oral health therapist, dental prosthetist, dental technician, dental laboratory technician, rural, remote, regional, recruitment, retention, workforce, intervention, strategies, inequitable distribution and professional mobility.

2.3.4 Study criteria

The study criteria of the review is summarised in Table 2-1.

Table 2-1: Inclusion and exclusion criteria for literature review

Criteria	Inclusion	Exclusion
Time period	Within the time period 1990–June 2013	Historical literature
Language	English	Non-English
Place of study	Australia and Organisation for Economic Co-operation and Development (OECD) countries	Developing countries
Setting	Rural and remote areas	Urban or metropolitan areas
Participants	Dental practitioners (dentists, dental hygienists, dental prosthetists, dental therapists and oral health therapists)	Dental students before graduation

Inclusion criteria covered English-language studies and reviews in OECD countries between 1990 and June 2013.

The rationale for the start year for the review was that health workforce shortages were identified at the end of the 1990s in many OECD countries (Organisation of Economic Co-

operation and Development 2008). Since then, this issue has attracted attention in both the academic literature and from government policy. Studies which included allied health professionals (AHP) or primary health care workforce were only included if they specified the inclusion of at least one of the dental practitioner types outlined. The reference lists of included studies were also hand searched for relevance. As there is no universally used definition of rural in the literature (Laven, Laurence et al. 2005), this study used a common-sense approach to refer to rural communities based upon their distance from the nearest major city, access to amenities and resources and their population size (Campbell, McAllister et al. 2012). In this study, recruitment referred to a newly employed member of an organisation and retention to the length of time between starting and finishing employment with a particular organisation.

2.4 Results

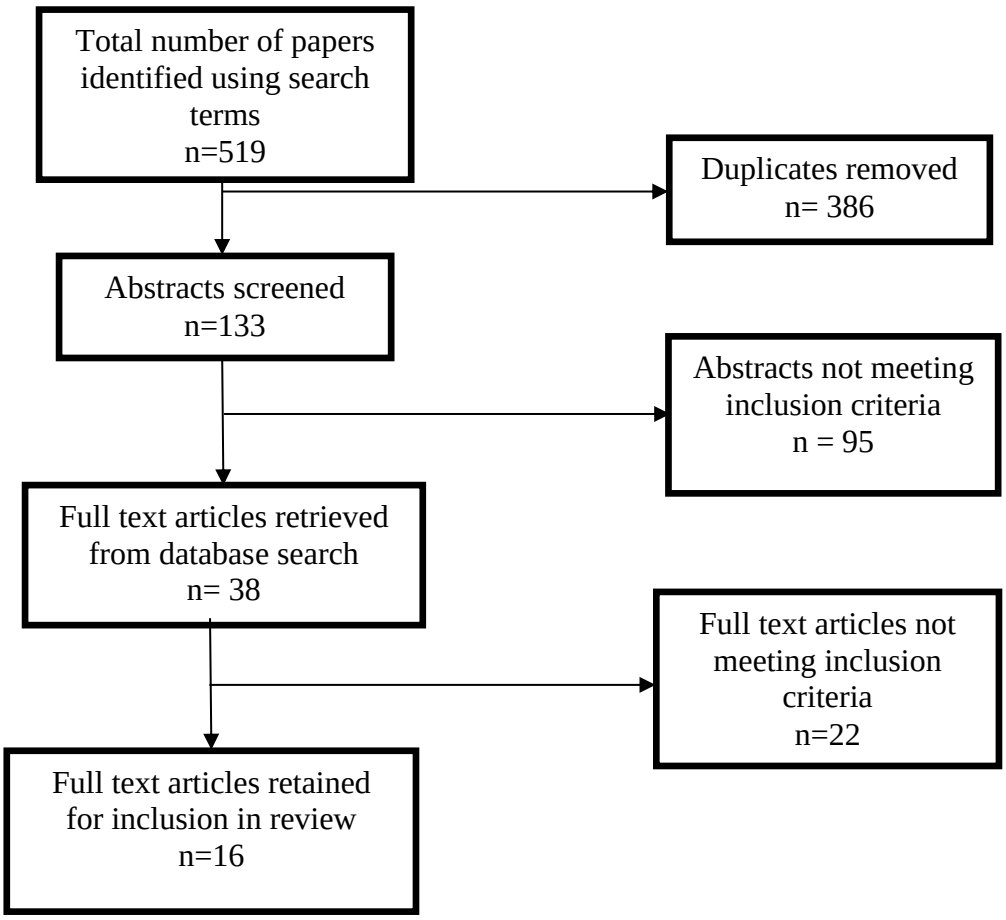

Figure 2-1: Search Strategy

The results of the literature search are detailed in Figure 2-1. From an initial pool of 519 papers, 16 articles published in the literature met the inclusion criteria. An overview of the findings on factors and strategies associated with recruitment and retention of dental practitioners in rural and remote areas are shown in Table 2-2.

Of these studies, eight were conducted in Australia, six in the United States, one in the United Kingdom, and one was a Cochrane Review. Of the eligible articles, four were retrospective studies using historic workforce data, two were literature reviews, eight were surveys, one was a mixed methods study, and one was a descriptive study. Regarding the type of dental practitioners, seven studies focused on dentists (Silva, Phung et al. 2006, Bazen, Kruger et al. 2007, Bazargan, Chi et al. 2010, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010, Skillman, Doescher et al. 2010, McFarland, Reinhardt et al. 2012), one on therapists (Kruger, Smith et al. 2007), four on two or more dental practitioner types (Kruger and Tennant 2004, Kruger and Tennant 2005, Hall, Garnett et al. 2007), most commonly dentists, dental specialists (such as orthodontists), dental therapists and dental hygienists grouped together, while the others focused on one or more dental practitioner types which then bundled together the results with other health disciplines (Richards, Farmer et al. 2005, Daniels, VanLeit et al. 2007, Grobler, Marais et al. 2009, Kruger, Jacobs et al. 2010, Campbell, McAllister et al. 2012). Noticeably, there were no studies which addressed the dental prosthetists/technician's rural workforce distribution.

The studies reviewed focused on the dental practitioner workforce inclusive of practitioner types and their rural work movements in relation to attitudes, barriers and incentive schemes. Of the articles reviewed none focussed on the practice location motivators of dental practitioners on a grand or national scale. Australian research was the most commonly found in the review. Survey articles focused on influences and motivational factors of the rural work movements of dental practitioners, each had narrow focus on the particular geographical region of practice, graduating university and/or timeframe.

There were three literature reviews, two from Australia and one international Cochrane Review. One Australian review identified the motivational factors of dental practitioners and other health professionals towards rural practice (Campbell, McAllister et al. 2012). The Cochrane Review focused on the effectiveness of rural engagement strategies aimed at increasing and stabilising the rural health workforce (Grobler, Marais et al. 2009). The review found 13 studies made reference to other health disciplines rural health workforce research and assumed that the theories from these studies were applicable to the rural dental practitioner workforce (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Smith and Tennant 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Grobler, Marais et al. 2009, Bazargan, Chi et al. 2010, Renner, Westfall et al. 2010, Skillman, Doescher et al. 2010, Campbell, McAllister et al. 2012, McFarland, Reinhardt et al. 2012).

2.4.1 Rural background and rural placement experience

Prior rural exposure was a common theme in the literature; it was suggested to be the most influential factor in determining the probability of rural practice recruitment and retention for dental practitioners. This term encompassed hypothesises that dental practitioners with a rural upbringing (Kruger, Jacobs et al. 2010, McFarland, Reinhardt et al. 2012) or had participated in rural placement programs during their training (Bazen, Kruger et al. 2007, McFarland, Reinhardt et al. 2010) were more likely to work in rural practice and for longer periods of time than their urban counterparts.

2.4.2 Positive and negative motivational factors

Nine of the studies reviewed outlined positive and negative motivational factors influencing decisions to work in, remain working in or leave rural practice. Of these studies; ten outlined positive factors towards rural practice. The most commonly reported positive influences of rural practice were a wide range of challenging clinical exposure (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012), increased clinical and administrative experience (Bazen, Kruger et al. 2007, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012), enjoyable patient base (Bazen, Kruger et al. 2007), appropriate salary remuneration (Bazen, Kruger et al. 2007, Kruger, Smith et al. 2007, Campbell, McAllister et al. 2012), personal and professional support networks (Kruger and

Tennant 2005, Daniels, VanLeit et al. 2007, Renner, Westfall et al. 2010, Campbell, McAllister et al. 2012, McFarland, Reinhardt et al. 2012), and successful integration into the community and the enjoyment of rural lifestyle for both the individual and their family (Kruger and Tennant 2005, Hall, Garnett et al. 2007, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010, McFarland, Reinhardt et al. 2012).

The most commonly reported negative aspects of rural life were social and professional isolation (Kruger and Tennant 2004, Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Campbell, McAllister et al. 2012), limited access to facilities and activities (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007), increased workload and inadequate time off duty (Kruger and Tennant 2005, Hall, Garnett et al. 2007, Kruger, Smith et al. 2007), type of clinical work undertaken (Hall, Garnett et al. 2007), access to further education and professional development opportunities (Kruger, Smith et al. 2007, Campbell, McAllister et al. 2012), access to education for children (Kruger and Tennant 2005, Richards, Farmer et al. 2005), limited job opportunities for the individual or their partner (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Renner, Westfall et al. 2010), their own or their family's dissatisfaction with rural lifestyle and inability to successfully integrate into the rural community (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Kruger, Smith et al. 2007, Bazargan, Chi et al. 2010, Renner, Westfall et al. 2010).

2.4.3 Strategies

There were eleven articles which investigated strategies aimed at increasing recruitment of dental practitioners into the rural health workforce. The majority of the strategies outlined were financial in nature (Grobler, Marais et al. 2009). The US strategies included were: the increased use of foreign-trained dentists in rural areas (Bazargan, Chi et al. 2010), and student loan repayment schemes to encourage new graduates to work in rural areas (Daniels, VanLeit et al. 2007, Bazargan, Chi et al. 2010, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010). Australian strategies included were increasing salaries and financial remuneration

(Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007). The international strategies included were increased financial remuneration (Grobler, Marais et al. 2009).

The most commonly mentioned factors influencing retention were social and personal issues, related to the successful formation or pre-existence of strong social bonds to the particular community and enjoyment of rural lifestyle (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Grobler, Marais et al. 2009, Renner, Westfall et al. 2010). The strategies aimed at the retention of rural dental practitioners identified in this review were focused on successful integration into rural communities and rural lifestyles through increasing rural exposure. The strategies included were: increasing the number of dental students at universities with rural upbringings (Silva, Phung et al. 2006, Grobler, Marais et al. 2009) in Australia and internationally; rural placement programs during training (Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007, Grobler, Marais et al. 2009) in Australia, internationally and in the UK; increasing dental school locations in rural locations (Grobler, Marais et al. 2009, McFarland, Reinhardt et al. 2010) internationally and in the US. Other factors influencing rural recruitment and retention were desire for a rural lifestyle (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007), challenging job opportunities (Kruger and Tennant 2005, Campbell, McAllister et al. 2012), increased exposure to a wide range of patients and increasing clinical skills (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012).

2.5 Discussion

The main finding of this review was that there was little comprehensive or definitive research into the influences on the work movement decisions made by dental practitioners. This review found many of the studies which fit the review criteria to be unable to comprehensively describe or investigate motivational factors beyond the boundaries of particular geographical areas or timeframes. They were also unable to measure the long term effectiveness of any of the interventions implemented to address the maldistribution of the dental practitioner workforce between metropolitan and rural areas. The lifestyle, social, political, economic and cultural environment of rural communities is vastly different from that of metropolitan areas and the

geographical, demographic and social landscapes of rural communities changed between different areas (Hall, Garnett et al. 2007). Rural communities share some characteristics that can negatively affect the manner in which health care was provided, such as the overall difficulty in providing adequate care for populations with limited resources (Skillman, Doescher et al. 2010). The problems associated with workforce stability of the rural dental practitioner workforce reflected those outlined in other health disciplines (Kruger and Tennant 2005, Wilson, Couper et al. 2009). Despite government intervention to increase the number of health professionals working in rural areas long-term, there remained no definitive evidence that these had been successful (Grobler, Marais et al. 2009, Wilson, Couper et al. 2009, Buykx, Humphreys et al. 2010, Robinson and Slaney 2013). The limited number of studies into this topic was seen by the fact that over three quarters of the studies reviewed made unproven assumptions. That what motivated medical doctors to work and remain working in rural areas were also true for the dental practitioner workforce (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Smith and Tennant 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Grobler, Marais et al. 2009, Bazargan, Chi et al. 2010, Renner, Westfall et al. 2010, Skillman, Doescher et al. 2010, Campbell, McAllister et al. 2012, McFarland, Reinhardt et al. 2012).

If one took a step back from the particular differences between rural medical and dental practice (Silva, Phung et al. 2006), and generalised the motivational factors towards health care provision in rural communities, several similarities appear. The most notable was the influence of the enjoyment of rural life through good personal relationships and community integration (Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007). For example, an Australian study (Humphreys, Jones et al. 2002) outlined the most important factors influencing medical practitioner's decisions about rural practice including professional issues, social factors relating to personal characteristics, family situation and external factors relating to community and geographical location (Humphreys, Jones et al. 2002). These factors were found to be similar to the motivational factors of rural dental practitioners' (Hall, Garnett et al. 2007). However, these results have not been tested in the dental practitioner workforce on a grand scale or in the long-term. Another Australian study (Chisholm, Russell et al. 2011) of rural allied health professionals found that patterns of recruitment and retention varied across

health discipline. Whereby depending on the profession, predicted length of stay could vary by up to two and a half years; in particular, podiatrists (18 months) and social workers (4 years) (Chisholm, Russell et al. 2011). The similarities between motivational factors for the rural medical workforce and the rural dental practitioner workforce remain untested, despite the shared assumptions which were seen in the mirrored strategies used in both health disciplines. There was disputed evidence of the long-term effectiveness of these strategies (Hall, Garnett et al. 2007). Although each individual study reviewed had a small sample size and limited scope, together they displayed similar results in terms of the factors which influence the recruitment of dental practitioners to rural practice.

The most commonly identified rural practice motivators for health professionals primarily related to an individual having positive experiences of rural life prior to moving into a rural community for work; prior rural exposure. This term was used to describe the influence of rural upbringing, participation in undergraduate rural placement programs, and having a partner with a rural background (Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012). This exposure could provide dental practitioners with knowledge and experience of the realities of living in rural areas as well as experience of the clinical and administrative expectations of working in rural areas (Bazen, Kruger et al. 2007). If the experiences are positive, it could influence both recruitment and retention (Bazen, Kruger et al. 2007). Dissatisfaction with rural practice can stem from the failure of rural life to meet expectations. Arguably, the strongest driver for rural practice among medical doctors is rural background of the individual (Laven and Wilkinson 2003, Laven, Laurence et al. 2005, Jones, Humphreys et al. 2012). This is called the rural back ground effect (RBE) (Teusner, Chrisopoulos et al. 2007, Jones, Humphreys et al. 2012). It was suggested that it could be twice as likely for a rural background medical student to work in rural practice as an urban background student (Teusner 2005). Familiarity and experience of rural environments and cultures played an important part in the decision making process surrounding rural practice for dental practitioners (Lyle, Klineberg et al. 2007, McFarland, Reinhardt et al. 2010), general medical practitioners (Eley and Young 2008, Humphreys, Wakerman et al. 2009, Robinson and Slaney 2013), nurses (Playford, Larson et al. 2006) and other health professionals (Lyle, Klineberg et al. 2007, Humphreys, Wakerman et al. 2009, Robinson and Slaney 2013).

However, dental practitioner workforce studies which investigated whether the RBE was significant found mixed results. Several (Richards, Farmer et al. 2005, Silva, Phung et al. 2006, McFarland, Reinhardt et al. 2012) concluded that it was heavily influential on long-term rural retention, while others (Hall, Garnett et al. 2007, Renner, Westfall et al. 2010) found that it had little influence on long-term retention.

The actual reasons behind the RBE are unknown. Jones and colleagues (Jones, Humphreys et al. 2012) suggested that it could be due to an increased ability to socialise and acculturate to the rural environment and the pre-existence of local social support networks. Individuals who displayed uncertainty towards working in rural communities could do so because of unfamiliarity with the rural lifestyle (Somers, Strasser et al. 2007), so prior experience of rural life can facilitate the ability to assimilate (Kruger, Jacobs et al. 2010). As a result of this, there were strategies in place to increase the number of rural student placements in health service university courses (Lyle, Klineberg et al. 2007, Skillman, Doescher et al. 2010), and by increasing awareness and useful information about health careers. Examples included the Rural Student Program in Australia (Kruger, Jacobs et al. 2010) and The University of Washington's School of Dentistry's Regional Initiative in Dental Education (RIDE) program (Skillman, Doescher et al. 2010) in the US. This experience was thought to promote positive attitudes and provide students with realistic expectations of rural practice (McAllister, McEwen et al. 1998, Bazen, Kruger et al. 2007). Some studies (McFarland, Reinhardt et al. 2010, Robinson and Slaney 2013) found that dental students who worked in rural areas after graduation were more likely to remain in or close to the rural area in which the rural placement was conducted or where the university was located. Whilst most of the medical workforce studies remain unproven in the long-term and free of bias, their preliminary findings should be considered highly relevant to this topic.

There was a lack of a definitive line drawn between the determinants of recruitment and retention in the literature. Many strategies focussed on recruitment and not retention (Silva, Phung et al. 2006), often at the detriment of the long-term health workforce of rural communities (Silva, Phung et al. 2006). This review found that most rural recruitment strategies were financial (Buykx, Humphreys et al. 2010). Financial and contractual incentives such as loan repayment schemes and Visa conditions were effective at increasing recruitment and short-

term retention, but were unable to provide enough of an incentive to influence long-term retention (Daniels, VanLeit et al. 2007, Grobler, Marais et al. 2009, Bazargan, Chi et al. 2010, Buykx, Humphreys et al. 2010, Renner, Westfall et al. 2010). It was found that it was a combination of job and lifestyle satisfaction which influenced long-term retention (Hall, Garnett et al. 2007). The differences between drivers of rural recruitment and retention exist because decisions which influence recruitment were made outside the context of actual rural practice (Eley and Young 2008). Retention decisions were made within it and were based on knowledge from personal experience (Eley and Young 2008). Therefore, aiming to increase rural recruitment will not by default lead to increased workforce retention. There was limited evidence on successful long-term rural dental practitioner workforce retention strategies (Lehmann, Dieleman et al. 2008, Grobler, Marais et al. 2009, Buykx, Humphreys et al. 2010).

The factors which influence retention were complex (Robinson and Slaney 2013) and individual factors should not be considered separately from other influences (MacIsaac, Snowdon et al. 2000, Hall, Garnett et al. 2007). Retention of health workers was thought to be influenced by various factors, including but not limited to job satisfaction (Humphreys, Jones et al. 2002, Hall, Garnett et al. 2007, Humphreys, Wakerman et al. 2009), career satisfaction (Hall, Garnett et al. 2007, Humphreys, Wakerman et al. 2009), group cohesion and management (Hall, Garnett et al. 2007), professionalism and autonomy (Hall, Garnett et al. 2007), cultural needs (Hays, Veitch et al. 1997, Han and Humphreys 2005, Panozzo, Laurence et al. 2009), education opportunities (Hays, Veitch et al. 1997, Han and Humphreys 2005, Eley and Young 2008), and contentedness of family (Han and Humphreys 2005, Panozzo, Laurence et al. 2009). The multidimensional complexity of health care provision meant that interrelated factors like personal contentedness and enjoyment of the social, economic, political and cultural environment all played important parts in retention rates (Humphreys, Wakerman et al. 2009, Robinson and Slaney 2013). Several studies (Veitch and Grant 2004, Richards, Farmer et al. 2005, Hall, Garnett et al. 2007) indicated the importance of community involvement and enjoyment as key in ensuring health workers remained in rural practice long-term. This can be seen in the retention of foreign-trained dental practitioners (Bazargan, Chi et al. 2010), as one of the most important factors of long-term retention in these situations was the successful integration of the individual and their families into the community (Han and Humphreys 2005,

Daniels, VanLeit et al. 2007). When the individual become lonely or isolated without close support networks, they left, irrespective of how much money was offered. There were many other factors which influenced rural workforce retention and recruitment which were unable to be fully investigated by this study, such as aging populations and their changing dental requirements (Ettinger 1997), an increased female oral health workforce (McKay and Quinonez 2012), cultural differences and language barriers (Bazargan, Chi et al. 2010), and life stage expectations (Kruger, Smith et al. 2007, Schoo, McNamara et al. 2008).

The influence of the changing nature of workforce trends across the board was evident in different age groups seeking different things from their employment opportunities (Schoo, Stagnitti et al. 2005). Several wider health discipline studies suggested that very few students envisaged their careers to remain in only one place for the entire length of their career (Orpin and Gabriel 2005, Tolhurst 2006), creating further challenges for recruitment and retention strategies. The nature of health workforce sustainability is complex; strategies should not address one singular aspect of the issue. They should be adaptable in order to be able to address the changing needs of dental practitioners (Humphreys, Wakerman et al. 2006). Research into such strategies does not yet exist to provide a useful tool for such a comprehensive solution. It would be misleading to assume that strategies aimed at improving health workforce issues in one area would by default also work for other rural areas (Hall, Garnett et al. 2007). Suggestions for improved rural oral health service delivery, not covered in the review included the increased use of telemedicine and teledental services (Summerfelt 2011), outreach or periodic visiting health services, better health promotion and education, increased domiciliary support, better service integration between health services and disciplines, improved transport options and financial subsidies (Humphreys, Wakerman et al. 2006). This paper provides a focused review into the rural dental practitioner workforce independent of other health practitioner types, such as allied health professionals (AHP). Previous literature reviews into the rural dental practitioner workforce combined several rural health disciplines providing generalised findings. As a result of this specification, this article found that all of the ideas, theories and current strategies relating to the subject of an unequal distribution of the international dental practitioner workforce are firmly based on those from the rural medical workforce literature without any real proof of the relevance of these ideas.

There are several limitations which characterise this review. The review was unable to quality assess each of the included studies using a priori quality assessment tool due to their limited focus and scope, and their mixed discipline results. Many of the studies focused solely on dental practitioners who were working in specified geographical areas, or graduated from particular universities during limited time frames (Kruger and Tennant 2004, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Bazargan, Chi et al. 2010, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010, Robinson and Slaney 2013). Several other studies grouped the dental practitioner types together or with other health disciplines (Richards, Farmer et al. 2005, Daniels, VanLeit et al. 2007, Grobler, Marais et al. 2009, Campbell, McAllister et al. 2012) so they were unable to provide a definitive discussion of dental practitioners' rural work movements, simply an overview of generalised health disciplines. Another limitation of the study is that grey literature was not included in this review.

2.6 Conclusions

The limited number of studies into the maldistribution of the dental practitioner workforce between metropolitan and rural areas suggested that further, more comprehensive research is required to investigate the issue; covering all dental practitioner types in detail, and independent of other health disciplines. The studies reviewed were unable to comprehensively describe or investigate the motivational factors influencing rural practice beyond the boundaries of particular geographical areas or timeframes or to measure the long-term effectiveness of any of the interventions. However, the studies share some characteristics. Most of the current recruitment incentives were financial and contractual in nature even though their ability to influence long-term workforce stability remained unknown and were suggested to actually increase turnover, because the most influential long-term retention factors for rural practice were personal.

This review also uncovered one important question which remained in the international dental practitioner workforce literature. How relevant were assumptions made from the rural medical workforce studies in explaining the patterns seen in the rural dental practitioner workforce? An individual's prior rural exposure experiences were considered by many medical workforce studies to be the most influential factors towards the predictor of long-term rural workforce

retention. The most important of these was arguably rural upbringing of the individual (McFarland, Reinhardt et al. 2012). However, the dental practitioner workforce literature was contested on the subject (Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Renner, Westfall et al. 2010, McFarland, Reinhardt et al. 2012). The relevance of rural practice motivators for the medical workforce to those of the rural dental practitioner workforce requires further testing. Better understanding of the determinants of workforce choice for dental practitioners will enhance service delivery through the provision of a more stable and accessible workforce (Renner, Westfall et al. 2010).

2.7 Postscript

This chapter has presented the literature relevant to the global dental workforce mal-distribution between urban and rural areas. Presented in **Appendix A**, is the supplementary findings from the updated current relevant literature, July 2013 to July 2016.

Table 2-2: Factors and strategies associated with recruitment and retention of dental practitioners in rural and remote areas

Author and year	Country	Objectives	Methods	Subjects	Practitioners	Outcomes
Bazargan, Chi et al. 2010	USA	Investigated a strategy aimed to increase area shortages: foreign-trained dentists	Historical data	688	Dentists	Unlikely to increase workforce in vulnerable areas.
Bazen, Kruger et al. 2007	Australia	Investigated the effects of rural placement on rural practice	Survey	Unknown	New dental graduates and students	Inconclusive if rural placement during university will increase the likelihood of rural practice.
Campbell, McAllister et al. 2012	Australia	Identified motivators of health practitioners towards working in rural areas	Literature review	35 articles	Dentists, Hygienists, Therapists, Allied health professionals	Identified factors which can lead to high staff turnover and decreased job satisfaction.
Daniels, VanLeit, Skipper et al. 2007	USA	Identified factors associated with recruitment and retention in the rural health workforce	Survey	1135	Hygienists, Allied health professionals	Health professionals from rural backgrounds and with increased age at graduation were more likely to work in rural areas/also identified important social factors and attitudes.
Grobler, Marais et al. 2009	International	Assessed the effectiveness of interventions to increase recruitment and retention of the rural health workforce	Cochrane Review	No articles fit the selection criteria	Dentists, Other health disciplines	There were no articles which supported interventions aimed to increase the dental practitioner workforce which were free of bias.
Hall, Garnett et al. 2007	Australia	Identified factors influencing work movement decisions	Interview and survey	63	Dentists, Dental specialists, Therapists,	Prior rural experience influenced rural practice. Social factors were important for long-term retention. Financial incentives attracted workers in the short-term.

					Hygienists	
Kruger, Smith, & Tennant, 2007	Australia	Analysed the reasons for dental therapists leaving the profession with focus on rural and remote areas.	Survey	253	Dental Therapists	Increased salaries, living support, travel assistance, access to continuing education, recruitment of more rural students and more flexibility may increase retention and recruitment of dental therapists in rural areas
Kruger & Tennant, 2004	Australia	Assessed demographics of Australian dental practitioners	Survey	168	Dentists, Hygienists, Therapists	Outlined generalised profile of rural dental practitioners.
Kruger & Tennant, 2005	Australia	Investigated the influences of rural practice and retention factors	Survey	168	Dentists, Hygienists, Therapists	Lifestyle was the most common factor which attracted respondents to rural work. Responses differed from male to female.
McFarland,Reinhardt& Yaseen, 2010	USA	Investigated rural back ground effect (RBE)	Historical Data	879	Dentists	Dentists with prior rural exposure were more likely to work in rural practice.
McFarland,Reinhardt& Yaseen, 2012	USA	Tested hypothesis of rural background effect (RBE)	Historical Data	1361	Dentists	Dentists with rural backgrounds were more likely to work in rural practice.
Renner, Westfall, Wilroy et al. 2010	USA	Investigated whether student loan repayment programs (LRP) had an impact on where a health professional works	Survey	93	Dentists	The LRP schemes had little influence on rural practice.
Richards, Farmer et al. 2005	UK	Investigated the key ‘predictors’ of rural practice	Survey	1077	Dentists, Dental nurses, Other health practitioners	Health practitioners with rural background were more likely to work in rural practice. Social isolation and access to facilities were negative influences of rural practice.
Silva, Phung, Huynh et al. 2006	Australia	Investigated the factors which	Survey	109	Dentists	New graduates often worked in underserved areas in order to increase their clinical skills.

		influenced practice location				
Skillman, Doescher, Mouradian et al. 2010	USA	Identified challenges to oral health in rural America including workforce stability	Descriptive Article		Dentists	Identified requirements for rural oral health such as flexibility and resources. Increased focus on prevention and cross-discipline approaches.
Smith & Tennant, 2006	Australia	Investigated the dental workforce in Western Australia	Historical Data	1101	Dentists Including specialists	More dentists were registered in metropolitan areas. Local graduates were more likely to practice in area compared with other graduates.

3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the steps undertaken to conduct this research project. Illustrating the rationale behind the researchers' use of chosen procedures used to identify, select, and analyse the information applied to understanding the research questions and developing the hypothesis within the conceptual framework. In order for others to understand what this research project did and why, this chapter will outline the thought processes and actions of the study, and will provide a solid foundation for conducting the research methods.

3.2 Conceptual framework

The conceptual framework outlines the key factors, concepts and relationships within the study, the system of concepts, assumptions, expectations, beliefs, and theories that support and inform the research (Miles and Huberman 1994: 18). It is the tool used to outline and organise the concepts and ideas that holds the research together, to sum up how the researcher aims to answer the research questions and to provide a 'how to guide' for another researcher to replicate the study. The conceptual framework combines the 'what was done in the study' with the theories and ideas related to the topic so that the links between them can be appreciated and understood.

The conceptual framework is an orderly process of steps and it develops over the course of the study. Smyth (Smyth 2004) outlined the steps of the conceptual framework as: providing clear links from the literature to the research goals and questions; informing the research design; providing reference points for discussion of literature, methodology and analysis of data; and contributing to the trustworthiness of the study.

There was an identified pattern of maldistribution of dental practitioners between urban and rural areas in Australia, and there are associated oral health outcome inequalities between rural and urban populations. This study used inductive theory, beginning with this observed workforce maldistribution pattern to develop research questions to explore, formulate a

tentative hypothesis, and proceed to develop theories to explain this pattern. The unequal distribution of health professionals between urban and rural areas within OECD countries is a globally identified issue. However, the particular complexities of the rural Australian environment, and the manner in which dental care is provided and paid for in Australia has not previously been investigated as influential to specific rural dental workforce decisions for dental practitioners in the Australian context. This knowledge gap has resulted in inconsistencies between given assumptions and tested theories in previous literature.

The literature review provided an outline of the key factors associated with the international urban/rural maldistribution of dental practitioners and identified knowledge gaps. Scoping interviews were conducted as a hypotheses-generating tool for development of an online survey. The knowledge gaps in question related to the influence of prior rural experiences on rural practice choice of dental practitioners: rural exposure during upbringing - having a rural background/growing up in a rural area. The conceptual framework overviews are provided in the figures below (Figure 3-1: Conceptual diagram and Figure 3-2: Conceptual map).

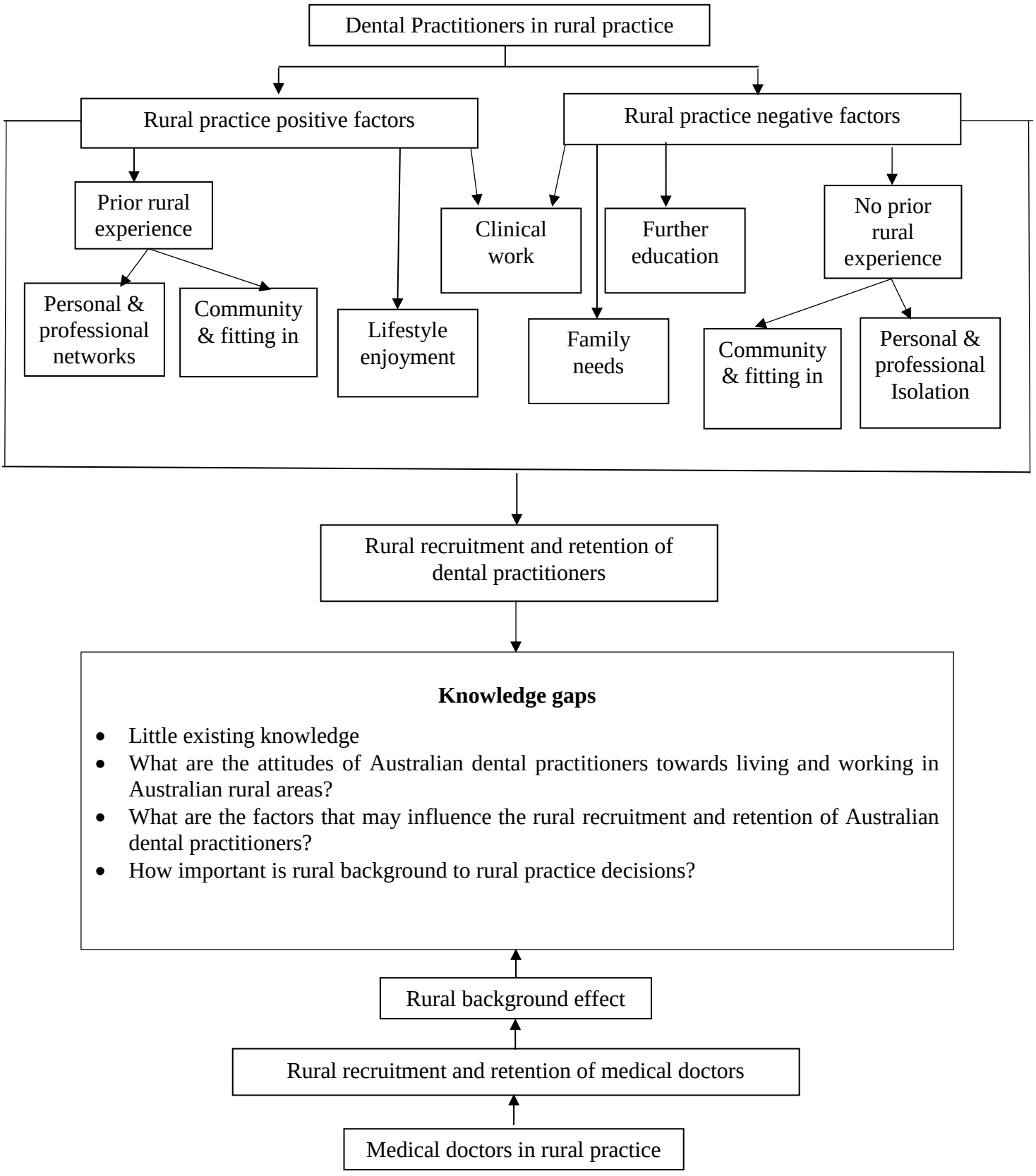

Figure 3-1: Conceptual diagram

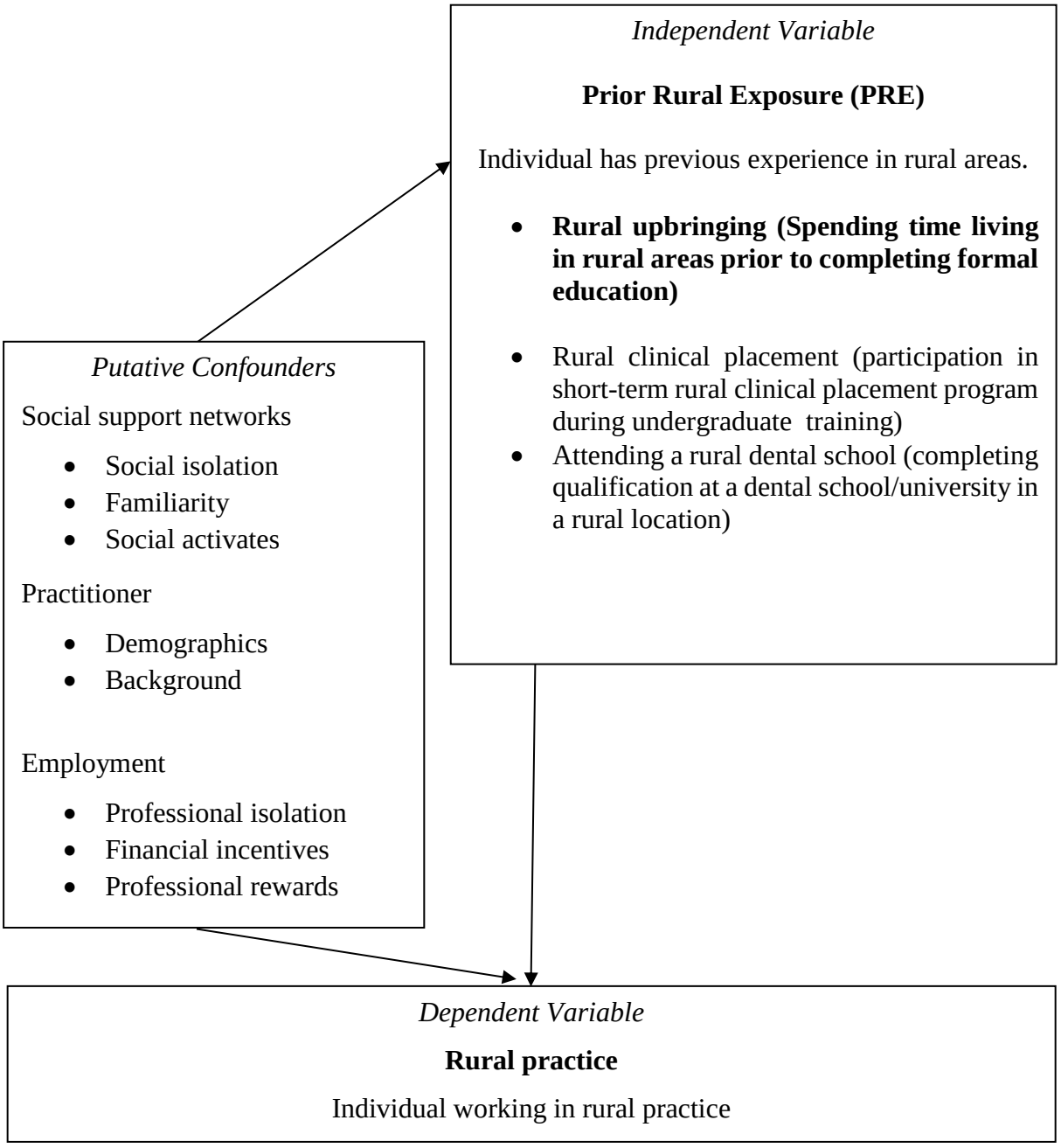

Figure 3-2: Conceptual map

Identified in the diagram (Figure 3-2), the conceptual map framework of the research follows the variable; Prior Rural Exposure (PRE), the individual had been exposed to rural areas prior to entering the workforce. Identified by the literature review, the key factor influencing rural practice was rural background. The other factors influencing rural practice identified in the literature were clinical rural placement experience during undergraduate training and attending a dental school in a rural location.

PRE themes were related to: Social structure and support networks available to the dental practitioner in the local area, the personal needs and demographics of the individual, and professional and financial incentives available in rural areas.

To address the knowledge gaps, and to test the assumption that dental practitioners, like medical doctors who have a rural background are more likely than their urban background counterparts to work in rural areas, two research questions and one hypothesis were developed.

3.2.1 Aims

(RQ1) What are the attitudes of Australian dental practitioners towards living and working in Australian rural areas?

(RQ2) What are the factors that influence the rural recruitment, retention, and turnover of Australian dental practitioners?

3.2.2 Hypothesis

(H1) (a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so this will be more pronounced for female dental practitioners than for male dental practitioners.

The research questions lead straight from the literature review, they are central questions (Cresswell 2014: 129), because there was little existing knowledge on what Australian dental practitioners think of rural practice; the first research question is an exploration of the central phenomenon. It investigated the attitudes of dental practitioners towards rural practice: how

they felt about rural practice and their positive and negative feelings towards working and living in a rural area in comparison to living and working in an urban environment.

The second research question aimed to create a comprehensive list of factors that may influence rural practice decisions to fill some of the knowledge gaps in the existing research. The research questions explore the issue of dental practitioner workforce maldistribution without limiting the views of the participants.

The quantitative hypothesis is a prediction made by the researcher of expected outcomes and the relationships between variables (Cresswell 2014: 132). The hypothesis aimed to test the previously untested assumption that dental practitioners' rural practice decisions were influenced by rural background.

3.3 Research design

The research design is the study's overall strategy and describes the procedures for collecting, analysing, interpreting and reporting data to seek answers to the research questions and hypothesis (Cresswell and Plano Clark 2007: 31). Although research design occurs at the beginning of a study, it outlines and explains all the steps throughout the project. It guides the reader through the initial assumptions of the researcher, and how the assumptions were linked with the research design and the specific methods of data collection, data analysis, and interpretation (Cresswell 2014: 18). These decisions identify which approach was used to study the topic and will define and identify the different models possible to undertake the study, amid careful selection and explanation of the best research model for the best outcome of the study. The first step is to identify the research problem and justify the research approach the researcher used to investigate it.

3.3.1 Research approach

The research approach is the preliminary plan for the study, the ideas and assumptions of the procedures of collection, analysis, and reporting of the data (Cresswell 2014: 4). In health research, there are three commonly utilised research approaches. These are qualitative, quantitative, and mixed methods. Cresswell (2014: 32) states that qualitative and quantitative approaches are not opposites of each other, nor are they interchangeable. Instead, what they

represent are different ends of a continuum of scientific inquiry (Newman and Benz 1998: 15). Mixed methods stands in the middle of this continuum, it brings together elements of both qualitative and quantitative research methods.

3.3.1.1 Qualitative research methods

Qualitative research methods allow the analysis, exploration and understanding of the meaning participants ascribe to a social experience in detail by using processes such as interviews, and focus group discussions (Hennink, Hutter et al. 2011: 9, Cresswell 2014: 16). These methods are used to understand the study populations' assumptions and beliefs that may motivate certain behaviours. These research methods are the processes for exploring, understanding, and analysing unstructured data, and allowing the participants to demonstrate and interpret behaviours from their perspective within the study. Data analysis is done inductively, by building from particulars and arrangement by the researcher into generalised themes. This allows the researcher to interpret and explain the meanings behind the data collected (Cresswell 2014: 15). This is something that pure quantitative research methods does not enable. The ability to not only observe and measure, but to understand why. Qualitative research methods have become increasingly popular in health research. This increased popularity has led to an increased awareness of formal qualitative methodologies.

> *Qualitative research involves disciplined inquiry that examines people's lives, experiences and behaviours, and the stories and meanings individuals ascribe to them. (Denzin and Lincoln 2000: 19)*

3.3.1.2 Quantitative research methods

Quantitative research methods is the systematic imperial investigation of causal relationships between variables as a way to explain phenomena. The variables can be measured so that numbered data can be analysed using statistical procedures. Quantitative research methods provide quantified information and answers to research questions (George, Kruger et al. 2012). This research method is of particular help when testing hypotheses. Qualitative research methods begin with assumptions about testing theories deductively, protecting against bias, controlling for alternative explanations, and the ability to generalise and replicate the findings (Cresswell 2014: 15). Aliaga and Gunderson (2005: 1) describe quantitative methods as

> *Explaining phenomena by collecting numerical data that are analysed using mathematically based methods (in particular statistics). (Aliaga and Gunderson 2005: 1)*

3.3.1.3 Mixed methods

Mixed methods combines the strengths of both qualitative and quantitative research approaches. This method involves collecting both qualitative and quantitative data, integrating the data, and using specific designs that can involve philosophical assumptions and theoretical frameworks (Cresswell 2014: 18) The researchers collect mixed forms of data, including quantitative data and qualitative open-ended data (Creswell, Plano Clark et al. 2003: 209). This combination creates a link between the open-ended natures of generalised qualitative data, such as what would be collected from an unstructured phone interview with the closed-ended nature of quantitative data, such as an online survey (Cresswell 2014: 43). The underpinned assumptions of the benefits of the mixed methods approach is that it combines qualitative and quantitative methods to provide a more comprehensive understanding of the research question than either qualitative or quantitative methods acting alone.

> *Mixed methods research is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks. The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone (Cresswell 2014: 4)*

The approach to research involves philosophical assumptions as well as distinct methods and procedures (Cresswell 2014: 14). Cresswell (2014: 32) explains that the researcher needs to plan their study within the philosophical framework. These are assumptions, brought into the study by the researcher. The research design incorporates this framework, the research issue, and the research methods. The researcher must select a research approach that will best allow them to answer their research questions within the philosophical framework of the issue.

3.3.1.4 Research aims

The research aims at the emergence of the study were open-ended and broad. In this manner, the reader can clearly see that the initial research phase was seeking to identify key themes to

understand the issue of dental practitioner workforce maldistribution. The literature review, used as a hypothesis-generating tool, providing assumptions, themes, and ideas for the researcher to further focus on and test through the qualitative and quantitative research approaches. The research aims reflect the exploratory nature of the study's emergence. The qualitative phase allowed the researcher to ask in-depth questions of dental practitioners, identify themes, factors and important variables. Then the quantitative phase allowed the researcher to test the hypothesis.

3.3.1.5 Mixed methods research design

There are notable advantages to combining qualitative and quantitative methods in mixed methods research. Considering the differences in open and close-ended research questions both methods would yield beneficial results. The mixed methods research design was chosen to enable the researcher to benefit from the fuller understanding of a complex social issue. Something that was not possible using either quantitative or qualitative research approaches alone. The mixed methods approach enabled the researcher to fully scope out the key factors that influence rural recruitment and retention, then allowed testing of the validity of the key factor.

The research questions outlined previously can be categorised into 'types' so that the best approach for their analysis can be identified. Research questions (RQ1) and (RQ2) were both open ended narrative questions. They investigated opinions, attitudes, and stories. They were best asked to the participants directly. The hypothesis was attempting to explain observable phenomena, therefore it was a closed ended question.

The combination of both open ended and closed ended research questions indicated the benefit received from using both qualitative and quantitative research approaches. The mixed method approach can be strengthened by presentation of two separate data sets, which are distinct and clearly identifiable. The combination of qualitative and quantitative methods will create a more meaningful and comprehensive study than one singular approach. There are four major types of mixed methods research approaches.

3.3.1.5.1 Triangulation design

Triangulation design is the most well-known mixed methods approach. This method seeks to obtain different but complimentary data on the same topic to understand the research problem (Morse 1991, Cresswell and Plano Clark 2007: 62). This design combines the strengths of qualitative and quantitative methods by comparing and contrasting quantitative statistical results with qualitative findings (Cresswell and Plano Clark 2007: 62).

3.3.1.5.2 Embedded design

Embedded design is used when researchers want to use one data set to provide a supportive role in a study primarily focused on the other data set (Creswell, Plano Clark et al. 2003: 213). The foundation behind this approach is that because there are different research questions, requiring different types of data one data set is not enough to understand the research problem (Cresswell and Plano Clark 2007: 67).

3.3.1.5.3 Explanatory design

Explanatory design is a two-phase approach to mixed methods design. Where qualitative data aids in the understanding or builds upon quantitative results (Creswell, Plano Clark et al. 2003: 214). This approach is used when there are first results from quantitative data collection methods, which the researcher wants further (qualitative) explanation on (Cresswell and Plano Clark 2007: 72).

3.3.1.5.4 Exploratory design

Exploratory design is also a two phased mixed methods design. In this design, the qualitative methods are the first used, and help develop or inform the quantitative methods (Cresswell and Plano Clark 2007: 75). This design is used when there are no measures or instruments, the variables are unknown, or there is no underlying theory or framework for guidance. It is a useful tool to identify important variables, test a theory or assumption, or to explore a phenomena in-depth and then measure its prevalence (Creswell, Plano Clark et al. 2003: 217, Cresswell and Plano Clark 2007: 75). An overview of the exploratory design is provided in the figure, (Figure 3-3).

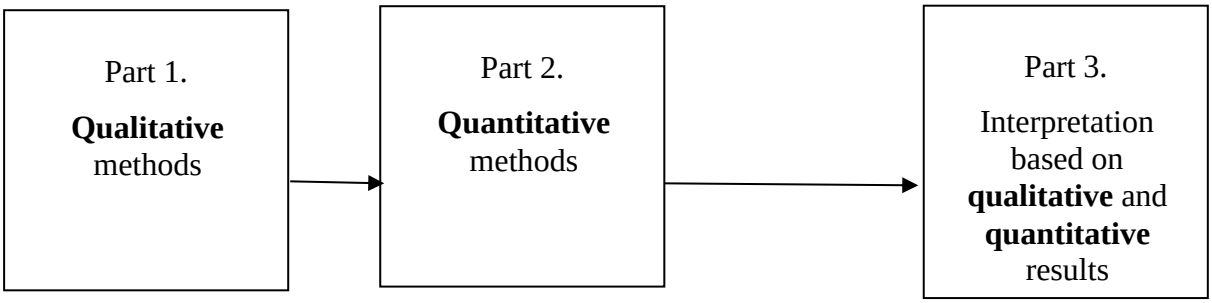

Figure 3-3: Exploratory Design

Understanding the characteristics of each of the mixed methods research designs, outlines the researcher's considerations for the research design. From the literature review, three key knowledge gaps were identified. There was limited existing knowledge on the subject of dental practitioner rural work movement decisions, there may be unknown and unexplored factors and variables that can influence rural work movement decisions; and there was a previously untested assumption transplanted directly from the rural medical workforce literature, that rural background was a key factor in rural practice.

There are two further variations to the explanatory design as explained by Cresswell and Plano Clark (2007). They are the instrument development model and the taxonomy development model (Cresswell and Plano Clark 2007: 76-77).

3.3.1.6 Instrument development model

The instrument development model allows the researcher to develop a quantitative instrument based on the findings from the qualitative data (Cresswell and Plano Clark 2007: 79). The researcher explores the topic in-depth with a small sample group of participants, and then utilises the findings to create a quantitative research tool (instrument). The second stage of data collection provides the researcher with a means to quantitatively validate and test the instrument (Cresswell and Plano Clark 2007: 79). An overview of the exploratory design: instrument development model is provided in the figure, (Figure 3-4).

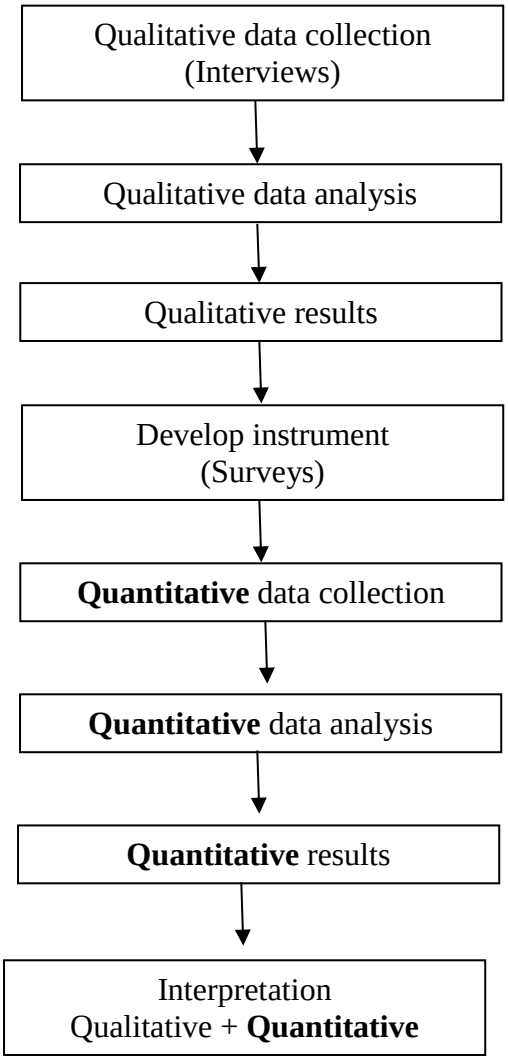

Figure 3-4: Exploratory design: instrument development model

3.3.1.7 Taxonomy development model

The taxonomy development model is used when the qualitative phase seeks to identify important variables and develop a theory. The secondary quantitative phase is then used to test or study the results in more detail (Morgan 1998, Tashakkori and Teddlie 1998, Cresswell and Plano Clark 2007: 79). The qualitative phase develops categories or relationships that direct the research questions and data collection used in the quantitative phase. This design is used when the researcher uses qualitative findings to develop quantitative research questions and hypotheses for testing (Cresswell and Plano Clark 2007: 79).

3.3.1.8 Strengths of explanatory design

Cresswell and Plano Clark (2007: 78) outline several advantages to the explanatory design. There are separate phases, allowing for straightforward design, implementation and reporting. The combination of qualitative and quantitative methods makes this approach more acceptable to quantitative biased audiences. The design is easily applied to multiphase research studies and single studies.

3.3.1.9 Challenges of exploratory design

There are also challenges. The design requires considerable time to implement. It can be difficult to specify the procedures of the quantitative phase to a review board as this phase is directly determined by the qualitative phase, and the consideration that participants in the qualitative stage may also be participants in the quantitative stage (Cresswell and Plano Clark 2007: 79).

3.3.2 Research design selection

Cresswell and Plano Clark (2007: 78) ask researchers to think about the research problem that they aimed to study, as the primary consideration was that the research design should match the research problem. Researchers using the exploratory design, are doing just that; exploring. They use qualitative research methods to collect data and explore a phenomenon. This knowledge is utilised to develop the quantitative research approach. Exploratory design allows the researcher to identify the themes within the phenomenon for further testing. This can be done by linking the results from the first phase qualitative data to identify important variables or develop a testing instrument used in the quantitative phase. The challenges associated with the exploratory

design were not considered limiting for the researchers when selecting this design, and the advantages were numerous.

The limited existing knowledge on the subject created issues with variable and theme identification for the initial stage of the research, this heavily influenced the timing decision (Cresswell and Plano Clark 2007: 81). The study required sequential implementation of each phase. The qualitative and quantitative phases of the study were not able to be run concurrently as the qualitative data were used to influence and develop the quantitative data collection methods. The qualitative data required collection and analysis prior to implementation of the quantitative stage as the first would influence the latter.

The researcher also needed to consider the relative weight of importance to answering the research questions of each phase (Cresswell and Plano Clark 2007: 81-82), each method can have equal weight, or one can hold more than the other. There were several different approaches to how this decision could be made. Morse (1991) suggests a theoretical drive or worldview. Morgan (1998) suggests that the strength of each phase's data collection method best appropriate to address the research problem should be considered. Cresswell (2014: 281) suggests that practical considerations should also be addressed. Equally weighing both methods uses more resources than an unequally weighted design, as well as considerations for the researcher's own strengths with each method. Given these considerations, this study is unequally weighted towards the quantitative methods. This is the final phase of the research; the qualitative phase was conducted as a supportive and advisory mechanism for the primary focus of the research, the quantitative research approach.

The final consideration for mixed methods design is the manner in which the qualitative and quantitate methods will be mixed. This applies to the final combination of both data sets. Done inappropriately this may create a study that is a collection of multiple methods (Cresswell and Plano Clark 2007: 83), not a true and strong mixed methods design. The mixing decision is done through merging the data sets, embedding the data sets at the design level, or connecting from data analysis to data collection (Cresswell and Plano Clark 2007: 83).

Merging the data sets occurs when the researcher takes the data sets and brings them together by either analysing them separately and then merging the results or analysing them together. Embedding the data at the design level is done by embedding one data set within the design of the other. Connecting from data analysis to data collection links the data sets together by using the analysis or one data set to develop the other. This could be done by collecting qualitative results that build to the collection and analysis of quantitative data. The connection is done through specification of research questions, selection of participants or development of a research instrument.

This study used the mixed methods research approach with quantitative methods to follow up on qualitative research; conducted in this fashion, to serve a specific purpose. Morgan (2015) explains that there must be some reason why the strengths of a quantitative method can add to what the qualitative results have already accomplished (Morgan 2015). The key reason for using this approach was to demonstrate that due to limited existing knowledge, the new core concepts uncovered by the qualitative research stage, apply more generally, beyond the original collection of specific cases (Morgan 2015).

3.3.2.1 Ethical considerations

There were ethical considerations to be addressed. The researcher was unable to provide the ethical review board with a finalised quantitative instrument at the time of submission; instead, a temporary survey was provided. The document included a note stating that the survey would be influenced by the results from the qualitative phase and an updated copy of the final document would be submitted as soon as it was available. This was necessary due to the limited factors and variables available to the researcher at the beginning of the project, and the early stages of the research relied strongly on medical workforce literature at the time of ethics approval.

The final challenge was the consideration that participants in the qualitative phase may also be participants in the quantitative stage. This was not considered an issue for the researcher, due to the relatively small number of participants in the first stage, and privacy concerns with the second phase made it impossible to identify any matching participants from both phases. The

research team discussed this possibility, and concluded that having the same participants in each phase will not be an issue for this study.

3.3.3 Instrument development and taxonomy development models

The first stage is qualitative; the second is quantitative, connected by the emergent theories from the qualitative phase. This allowed for the development of a quantitate instrument to test the theories in the second phase. The intent is to use the results from phase one to develop an instrument in phase two to test the theory of rural background. As there is emphasis on the quantitative phase and not the qualitative phase, the best choice of research design is the exploratory instrument development model.

3.3.3.1 Exploratory instrument development model

Interviews are often used in health sciences to develop survey instruments (Sofaer 2002). For this study, semi-structured interviews were conducted with Australian registered dental practitioners working and living in both rural and urban Australian areas. A self-completed online questionnaire was then developed using the key findings from the interviews. After the data collection was complete, quantitative and qualitative data were analysed separately using different techniques. The results from both research approaches were integrated and interpreted in the discussion section of this thesis.

There are several different data collection methods regularly used in mixed methods healthcare research. The qualitative and quantitative data collection methods are separately discussed in the following sections of this chapter. The study design is provided in the figure (Figure 3-5).

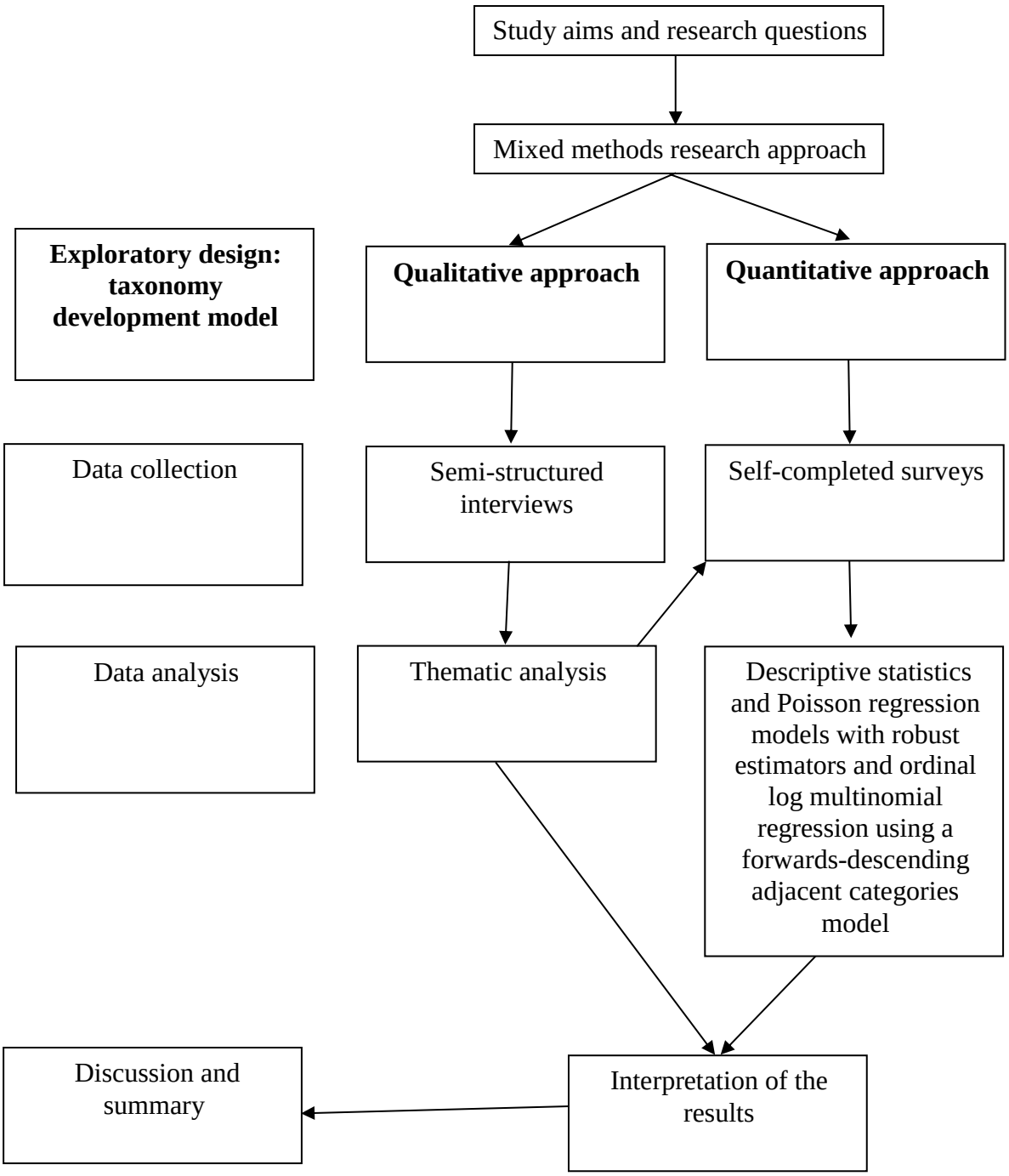

Figure 3-5: Study design

3.4 Qualitative approach [scoping interviews]

The qualitative methods used in this study to collect, analyse and report the data are outlined and described in this section. The topics covered will relate to the study's setting, inclusion and exclusion criteria, recruitment of participants, data collection processes, technical aspects, researcher's notes, rigor, and data analysis.

3.4.1 Semi-structured interviews

The scientific method can be outlined as observation, classification and interpretation. The aim of research is to identify, investigate and seek understanding of social patterns and social meanings (Walter 2010: 4). There are four basic types of qualitative data collection processes: There are strengths and limitations to each of these data collection processes, and the nature of the study's research questions created issues with several of these outlined options (Cresswell 2014: 239-240).

3.4.1.1 Qualitative observation

Qualitative observation requires the researcher to be present at each research site during the data collection; the research takes notes on the behaviours and activities of participants at the research site. This process was too expensive and time consuming to conduct because this study was a nation-wide study, with rural and remotely based participants working independently.

3.4.1.2 Qualitative documents

Qualitative documents are collected documents related to the research, requiring a quality source of documents to study. This process was not appropriate because there were limited prior knowledge on the subject.

3.4.1.3 Qualitative audio and visual materials

Qualitative audio and visual materials are data in several forms including photographs, art objects, videos or websites. This process was also rejected due to the limited prior knowledge on the subject.

3.4.1.4 Qualitative interviews

Qualitative interviews and focus groups are the most common methods of data collection used in qualitative healthcare research (Cresswell 2014: 239). The researcher conducts interviews, or focus group discussions with the participants. The process of qualitative interviews was selected due to its strengths in allowing the researcher to in-directly observe the participants. The historical and demographic nature of the research questions and their open-ended nature allowed for narrative and storytelling from the participants, while they outlined and explained their opinions. The researcher also has a level of control over the interview questions.

3.4.1.4.1 Focus groups

Focus groups are used to investigate the interactions between participants. The research topic was not considered to be potentially upsetting for participants to volunteer for a focus group, however, the researchers were not interested in the interactions between dental practitioners; they were interested in individual ideas and opinions.

3.4.1.4.2 Interviews

The study used one-on-one interviews because of the limited existing knowledge on the subject, and the researchers' aims to scope and discuss further factors possibly unknown in the research. The researcher utilised one on one semi-structured interviews, aimed to understand and interpret the experiences and opinions of the participants by viewing the world from their perspective. The scoping interviews used open-ended and direct questions so that participants could discuss their opinions, reasoning and background. The concept diagram is provided in the figure (Figure 3-6).

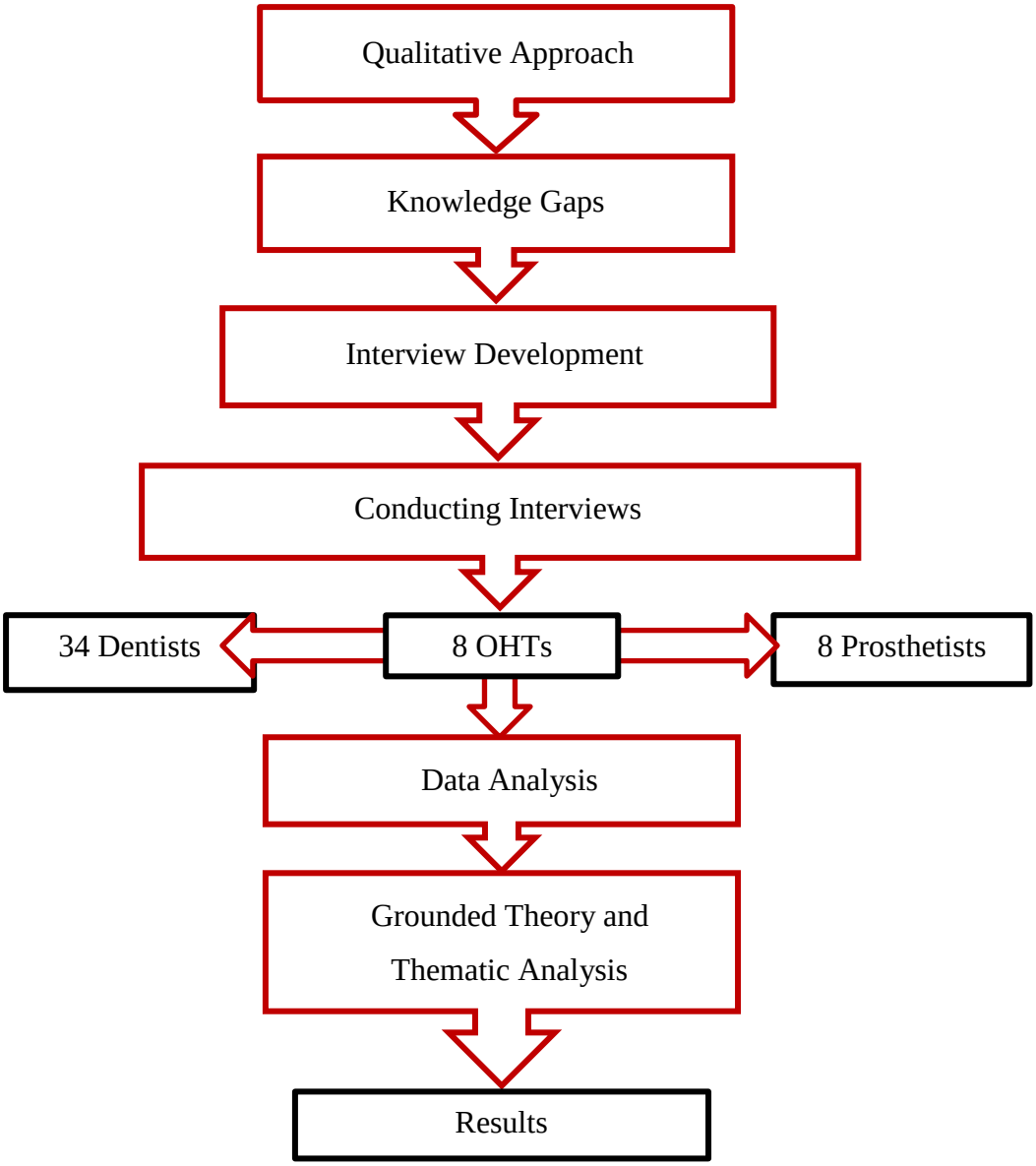

Figure 3-6: Outline of Qualitative Approach

3.5 Aims of interviews

The goal of the scoping interviews was to gather as much information as possible about the personal insights into attitudes and opinions about rural practice for Australian dental practitioners, to fill the knowledge gaps identified in the literature review, to avoid missing something fundamental in the study. The results from the interviews were utilised to finalise the questions in the survey.

3.6 Development of interviews

There were many knowledge gaps identified in the literature review that were used to develop the interview questions. The key knowledge gap was the assumed linkages between the rural work location drivers of medical practitioners and dental practitioners. The key factors identified in this manner were the influences of rural experience: the rural background effect and the influence of rural clinical placement programs during undergraduate training.

3.6.1 Interview questions

The interview questions included biographical and historic data from the participants as well as investigation into positive and negative factors about working and living in rural areas. The questions related to individuals' personal views about rural recruitment and retention, and what they felt could influence themselves or others to choose to work in rural practice. There were two parts to the interviews. The first section focused on personal experiences and opinions towards rural practice. This included a sub-section whereby the participants were asked to rate a list of previously identified potentially influential factors as important or unimportant towards their work location decision-making processes. The second section was background and demographic information about the participants. The final draft of the interview questions is included in the Appendix (see Appendix F).

3.7 Selection of participants

The participants in this study were Australian dental practitioners registered to practice in Australia. The number of dental practitioners interviewed needed to be large enough to give a balanced and comparable picture of the research topic and the emerging themes. The research team determined that 50 volunteers was sufficient in order to gather enough information to identify key themes due to the in-depth nature of the interview process and time and cost considerations. The study sample was considered large enough to draw conclusions on the main drivers that influenced rural recruitment and retention for the dental practitioners. The inclusion and exclusion criteria are detailed in Table 3-1.

Table 3-1: Inclusion and exclusion criteria for participants

Criterion	Inclusion	Exclusion
Sex	Males Females	None
Age range	Must be over 18 years of age to participate in the study	Individuals under 18 years of age
Type of dental practitioner	Dentist, Dental hygienist, Dental therapist, Oral health therapist, Dental prosthetists	Dental technician Dental nurse Dental technicians and Dental laboratory technicians
Place of training	Australia Overseas	None
Location of practice	Urban Rural	None

The Dental practitioner types included in the interviews are detailed in Table 3-2.

Table 3-2: Dental practitioner types included in the interviews

Name	Description
Dentists	Diagnose and treat dental disease, injuries, decay and malformations of the teeth, periodontal tissue (gums), hard and soft tissue found on the mouth and other dento-facial structures using surgery and other techniques.
Dental hygienists	Carry out preventative dental procedures under the direction of a dentist.
Dental therapists	Examine and treat diseases of the teeth in preschool, primary and secondary school children under the general supervision of a dentist. A dental therapist can also specialise as an oral health specialist.
Oral health therapists	In Australia, represent those dually qualified as hygienists and therapists, more recently qualified in a newly introduced Bachelor degree in Oral Health Therapy available from select universities (Australian Government Department of Health 2013, Defra Rural Statistics 2013). Oral health therapists provide a wide range of dental care in a variety of settings to children, adolescents and adults.
Dental prosthetists	Responsible for the construction and fitting of dentures and sporting mouthguards. They maintain, repair and reline dentures either by direct consultation with a patient or by referral from a dentist.

3.7.1 Criteria for Urban/Rural Classification

The concept of ‘remoteness’ is an important dimension of policy development in Australia (Hugo 2002), however, there is no universally used definition of ‘rural’ in the Australian and international literature (Laven, Laurence et al. 2005). This study used a common-sense approach to refer to rural communities based upon their distance from the nearest major city, which represents an area’s access to amenities and resources, and their population size (Campbell, McAllister et al. 2012).

3.7.1.1 Australian Standard Geographical Classification (ASGC)

The regional area classification system used in this study is the Australian Standard Geographical Classification (ASGC) from the Australian Bureau of Statistics (ABS) (Kahn, Hagopian et al. 2010, Australian Government Department of Health and Ageing 2012). The aim of this classification system was to divide Australia into broad regions for comparative statistical purposes (ABS 2001). This system replaced the older Rural, Remote and Metropolitan Areas (RRMA) classification system (Crouse and Munson 2006). The ASGC system has five categories for regions (Remoteness Areas – RA) in Australia. They are: RA1 - major cities, RA2 - inner regional, RA3 - outer regional, RA4 – remote, and RA5 - very remote. The classification is often utilised for quantitative data analysis of 'country' versus 'city' comparisons, or, for this study, ‘urban’ versus ‘rural’ comparisons. The tool was developed in response to the belief that in Australia 'city' people enjoy greater opportunities, have higher incomes and generally enjoy better outcomes than their 'country' counterparts (ABS 2001). However, it is impossible to quantify any differences without a definition of what constitutes the 'city' versus the 'country' so that data can be classified and compared.

The ASGC provides a framework, grouping locations together into comparative classes of remoteness for the collection, dissemination and analysis of data. The ASGC divides Australia into urban and rural areas for the purpose of comparison, but it does not distinguish between rural areas on the fringes of urban areas (ABS 2001). For example, it does not distinguish between the easily accessible rural outskirts of Sydney from hard to access rural areas in central Australia. It was not intended to be a standalone indicator of advantage or disadvantage between urban and rurally categorised regions (ABS 2001).

The boundaries between RA categories are arbitrary because there is no widely accepted standard that determines exactly where ‘urban’ becomes ‘rural’ (ABS 2001). The ASGC classifications simply group areas into classes where all members of a class have similar, but not identical, characteristics of remoteness (ABS 2001). The underlying measure of relative remoteness is also a nationwide approach. As a result, remote parts of Tasmania are remote because of their location in the context of the whole of Australia not just their location within Tasmania.

The inconsistencies of the accepted definitions of ‘rural’ and ‘urban’ create issues with standardising areas. For example, the ASGC categories restrict the number of areas categorised as RA1 to Western Australia, Victoria, Queensland, New South Wales and the Australian Capital Territory, thus eliminating the state capital cities of Tasmania and the Northern Territory from having any data for comparison in this category. In response to these issues, this project grouped RA1 and RA2 together and categorised them as urban, thus providing a more common-sense approach to the generally accepted idea of what is an urban area. In this study, urban areas included all of the Australian states and territories, not just those with large population sizes. This made the comparisons more stratified and comparable. There is also often an issue collecting enough data from the very remote locations, so remote/very remote are often combined in ABS datasets and reports. To address this, the study grouped RA3, RA4 and RA5 as the ‘rural’ category.

The Australian Bureau of Statistics updated the system during the process of this research. The Australian Statistical Geography Standard (ASGS) replaced the ASGC in July 2011 (Australian Bureau of Statistics 2014), but this development came too late in the project to be used for this research. This system is due for review every five years. An overview of the study’s remoteness area groupings and classifications are provided in the table (Table 3-3).

Table 3-3: Criteria for ASGC Remoteness Classification

Classification	Region	Study
Remoteness Area 1 (RA-1)	Major city	Urban
Remoteness Area 2 (RA-2)	Inner regional	Urban
Remoteness Area 3 (RA-3)	Outer regional	Rural
Remoteness Area 4 (RA-4)	Remote	Rural
Remoteness Area 5 (RA-5)	Very remote	Rural

3.7.2 Criteria for dental practitioner type classification

The dental practitioner groups included in this study were dentists (including specialists who were co-registered as both specialities); dental prosthetists; and the combined OHT grouping, which were dental hygienists, dental therapists, and oral health therapists (including those allied dental practitioners who could be registered as a combined qualification of dental hygienist, therapist and/or oral health therapist). Using data from Australian Health Practitioner Regulation Agency (AHPRA) (Dental Board of Australia, 2015) the key registration body for Australian health professionals, several discoveries were made.

The registration numbers of dental practitioners' work group division by state or territory of registration is provided in the table (Table 3-4). This table displays the proportions of dental practitioners who are registered in singular or multiple divisions. There was a small cross over between dental disciplines consisting of dental hygienist and dental prosthetist (n=3); dental hygienist, dental prosthetist, and dental therapist (n=2); dental hygienist and dentist (n=2); and dentist and oral health therapist (n=1). This was not considered an issue, as the participant would self-identify during the course of the interview. There was a much larger crossover in dental practitioner registration types in relation to OHTs: dental hygienist (n=1,381); the combined qualification of dental hygienist and dental therapist (n=483); dental therapist (n=1,063); and oral health therapist (n=1,161). These disciplines are similar in their clinical work type, scope of practice, and workforce demographics so the divisions of dental hygienist, dental therapist and oral health therapist were combined into one category (OHTs).

Table 3-4: Dental practitioners – division(s) by state or territory

Dental Practitioner	**Principal place of practice**									
Divisions	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	No PPP§	Total
Dental Hygienist‡	44	393	12	141	251	20	206	287	27	1,381
Dental Hygienist and Dental Prosthetist†		2		1						3
Dental Hygienist and Dental Prosthetist and Dental Therapist‡		1					1			2
Dental Hygienist and Dental Therapist‡	9	56	8	160	64	2	127	53	4	483
Dental Hygienist and Dentist*		2								2
Dental Hygienist and Oral Health Therapist‡		3						3		6
Dental Prosthetist†	15	421	4	256	67	49	349	85	3	1,249
Dental Prosthetist and Dental Therapist†							1			1
Dental Prosthetist and Dentist*							1			1
Dental Therapist‡	18	223	13	188	90	50	166	305	10	1,063
Dental Therapist and Oral Health Therapist‡								2		2
Dentist*	296	5,071	101	3,095	1,155	228	3,737	1,677	573	15,933
Dentist and Oral Health Therapist*		1								1
Oral Health Therapist‡	19	298	10	343	140	11	268	69	3	1,161
Total	401	6,471	148	4,184	1,767	360	4,856	2,481	620	21,288

§ No principal place of practice specified

(Dental Board of Australia 2015)

Table 3-5 provides the registration numbers and percentage by division with combined groups.

Table 3-5: Dental practitioner: Registration numbers and percentage by division with combined groups using DBA 2015 data for interviews

Division	Number	%
Dentist *	15,937	75%
Dental Prosthetist†	1,253	6%
OHT‡ (Dental Hygienist and Dental Therapist and Oral Health Therapist combination)	4,098	19%
Total	21,288	100%

3.8 Recruitment of participants

All 50 volunteers agreed to participate in the study and completed a consent form prior to being interviewed. Recruitment was facilitated by an advertising campaign through the Australian dental agencies: Australian Dental Association (ADA), Dental Hygienist Association of Australia (DHAA), and Australian Dental Prosthetists Association (ADPA). The dental professional associations were initially contacted via email, with an introductory statement from the researchers with a draft invitation letter to their members (see Appendix B: Invitation letter to third parties (dental professional groups) and a draft advertisement for their newsletters, (See Appendix C: Advertisement for media). The primary researcher followed up contact with the dental associations through email and phone.

3.8.1 Advertisements

The advertisements were conducted online (news bulletins, electronic newsletters, Facebook posts, classifieds), in print (printed agency newsletters) and by personal communications with the research team through dental industry associates, friends and colleagues, and via snowballing techniques. The ADA published an advertisement for recruitment for the study in their monthly printed and online News Bulletin. The DHAA published two copies of the recruitment advertisement in concurrent September and October 2013 printed and online Bulletin Newsletters. There was not a response from the Australian Dental and Oral Health Therapist Association (ADOHTA), until December 2014 despite on-going emails and phone calls; as a result, the association did not participate in the recruitment of interview participants. This was not an issue for recruitment of therapists because the combined registration of dental hygienists and therapists meant that three of the participants recruited from the DHAA were therapists, one was a hygienist/therapist combination, three were hygienists and one was an oral health therapist. The ADPA also promoted the study to their members because they felt that they had been overlooked by past approaches to the issue. This was supported by the finding that there was no literature on the rural work movements of dental prosthetists or dental technicians found in the literature review.

There were a substantial number of rural and remote practitioners who volunteered their time and service in the interviews, compared with a relatively limited number from urban centres.

One of the possible reasons for this was the project's subject. As this was a volunteer-based study, it appeared that dental practitioners who had personally worked in and experienced the issues of rural practice were more likely than urban practitioners to desire to speak out about their experiences.

3.9 Interview outline

Participants were asked about their opinions of rural practice and rural lifestyle, their personal experiences of rural practice and rural lifestyle, and whether they felt that there was anything that could be done to encourage more dental practitioners to work in rural areas. Both rural experienced and rural inexperienced practitioners participated in the study. The interview questions were developed as a guide to assist with the interview process and keep the interview moving. There is a full interview guide in the Appendix (see Appendix F).

3.9.1 Pretesting interviews

Three pre-testing interviews were conducted in person with Australian and overseas trained dental practitioners in Hobart, Tasmania. This was done in order to facilitate full understanding of the interview questions, to provide the researcher with experience and for feedback from participants on the interview process. Each of the participants were asked about the appropriateness of the questions, and their ability to understand and answer the questions. Participants were given the option to refuse to answer or identify any questions that they did not feel comfortable answering; wanted to know the reasons or theory behind any question they disapproved of; or discuss any feelings of discomfort or inability to fully answer any of the questions due to personal reasons. Suggestions for improvement or rewording any concerning questions were requested should this occur. None of the questions were identified in this category, so no further revision was considered to be required prior to the interviews being undertaken.

3.10 Conducting interviews

After email contact with potential participants, information sheets about the research and the interview processes as well as a consent form were emailed or posted to each practitioner (see Appendix D: Information sheet (interview participants), Appendix E: Consent form (interview).

Upon receiving this information, the practitioner and the primary researcher arranged an appropriate time for the interview to take place. The consent forms were completed and returned to the researcher prior to the interview taking place via email (most common method), facsimile, or post.

The interviews were conducted over the phone with the primary researcher and each participant at the agreed time. With the participants' consent, the interviews were digitally recorded over the phone using an Olympus DS3300 Digital Voice Recorder. The interviews were transferred into computer backups within the university operating system using the Olympus DSS Player Version 7 Software and transcribed verbatim by the interviewer into Word. The data were catalogued using the date of the interview and the participant's first name. The interview recordings were listened to alongside reading of their full transcriptions for quality assurance purposes.

The interviews were initiated in November 2013 and completed in March 2014. The interviews ranged in length from 30 minutes to 60 minutes dependent on the participant's willingness to speak, their free time, and their own comments. Each participant varied in the manner in which they answered the questions. For example, some practitioners answered in quick responses, and others offered in-depth background, comparisons and explanations. The researcher carefully read and reread the data before the analysis takes place looking for key words, trends, themes, and ideas in the data that could help outline the analysis (Guest, MacQueen et al. 2012: 10). After quality-assurance testing, the transcripts and audio files were imported into QSR-NVivo version 10 for Windows (QSR International Pty Ltd. 2015) for qualitative data analysis through coding.

3.11 Data analysis

The aim of qualitative data analysis is meaning making from the data (Willis 2010: 407). Qualitative research methods are common in healthcare research because they can be used to interpret, explore, or obtain a deeper understanding of certain aspects of human beliefs, attitudes, or behaviour through personal experiences and perspectives (George, Kruger et al. 2012). When working with text based data there is one most important basic analytical

technique, reading the text (Guest, MacQueen et al. 2012: 10). There are different methods of qualitative data analysis, which are dependent on the theoretical framework and the research questions (Willis 2010: 407-411). There are three qualitative concepts as outlined by Tracy (2013: 2-3). Self-reflexivity is the consideration of the ways that the researcher's experiences and opinions affect their interactions with and interpretations of the research setting. Context is the immersion by the researcher in a research setting and trying to make sense out of it. The description is the immersion by the researcher in a culture to investigate the particular circumstances within the setting. Only by doing so can they develop grander statements and theories.

Cresswell (2003: 247-249) outlined the typical steps for qualitative data analysis.

1. Familiarisation with the data through repeated reading.
2. Listening and transcription of interview material.
3. Organisation and indexing of data for easy retrieval and identification (e.g. by hand or computerised programs such as NVivo).
4. Sensitive data are made anonymous.
5. Coding and identification of themes.
6. Development of provisional categories.
7. Exploration of relationships between categories.
8. Refinement of themes and categories, and the development of theory and incorporation of pre-existing knowledge.

The literature review on the subject of rural practice for dental practitioners pointed towards the strong relationship between positive prior exposure to rural life and rural practice. This included rural upbringing and rural placement programs during training. These findings led the researcher to develop in-depth phone interviews to identify themes about rural practice. The interviews asked questions about how dental practitioners felt about rural practice and why they

felt they felt that way. They gathered personal opinions about the positive and negative aspects of working and living in rural areas, what participants' experiences of rural practice were, and how these opinions and experiences influenced why they chose to work where they did. The interviews also requested basic demographic data about the individual, such as where they grew up (to ascertain the rurality of the area to compare the influence of urban, rural, and overseas background) and gender, age, and marital status. This was conducted to match up differing opinions of rural practice with prior rural exposures and basic demographic characteristics.

There are numerous approaches to qualitative data collection and analysis. They represent a diverse range of epistemological, theoretical, and disciplinary perspectives (Guest, MacQueen et al. 2012). The main analytical methods short-listed for the qualitative section of the study, given the data collection method being interviews were narrative analysis, thematic analysis and grounded theory.

3.11.1.1 Content analysis

Content analysis is a research method which detects, records and analyses the presence of words or concepts in sample forms of communication (Sproule 2010: 323). The unit of analysis is the presence of words and the unit of focus is recorded communications - books, essays or newspaper articles.

3.11.1.2 Discourse analysis

Discourse analysis is understood as the method of research that highlights the importance of language in text (Jacobs 2010: 351). Discourse analysis is a broad field and there are different ways of engaging with it. The aim is to provide critical understanding of how language is used by making explicit the ideological and political context in which the text is situated (Jacobs 2010: 351). Discourse analysis and content analysis were not shortlisted methods for this study.

3.11.1.3 Narrative analysis

The short listed analytical methods: narrative analysis, thematic analysis and grounded theory were deemed more appropriate for consideration in use for the study given the data type to be analysed were first person semi-structured interview transcripts. These transcripts were exploratory in nature "what do dental practitioners think about rural practice?"

Narrative analysis is the making of sense from the data by focusing on the story being told by the participant and how this story links to broader social contexts (Willis 2010: 407). This method focuses on the ways in which people make and use stories to interpret the world (Lawler 2002: 242). The life story of the participant is the unit of analysis to research the way individuals create meaning in their lives as narratives (Clandinin and Connelly 2000: 12). The method is best suited for use with biographies, life histories or case studies. The researcher acts as an attentive listener and does not say very much (Lawler 2002: 243) whilst the participant recounts their life history or an event. Narrative analysis was discounted as a method for because participant life story was not the focus of this study.

3.11.2 Thematic analysis

Thematic analysis is the most commonly used form of qualitative analysis, it explores the presence of themes, both predetermined and emerging within the data (Willis 2010: 408). Thematic analysis does not just count word frequency, it focuses on identifying and describing the implicit and explicit ideas in the data - the themes (Guest, MacQueen et al. 2012: 10). These themes are then developed into representative codes. The emphasis on supporting claims with data is the link between thematic analysis and grounded theory (Guest, MacQueen et al. 2012: 10-11).

3.11.3 Grounded theory

Grounded theory is one of the most cited qualitative methodologies for qualitative health research (Sbaraini, Carter, Evans, and Blinkhorn, 2011) and is appropriate for use in smaller data sets (Guest, MacQueen et al. 2012: 12). Grounded theory is inductive, iterative, interactive and comparative. The methods are geared toward theory construction (Charmaz 2006: 2), and it is a design of inquiry from sociology in which the researcher derives a general abstract theory of a process, action, or interaction grounded in the views of participants. This process involves using multiple stages of data collection and the refinement and interrelationship of categories of information (Charmaz 2006: 2; Corbin and Strauss 2015: 9; Cresswell 2014: 42). Matching the exploratory nature of this phase of the research, grounded theory is an exploratory approach used to build theoretical models derived from the data (Guest, MacQueen et al. 2012: 12).

This study used grounded theory and thematic analysis to investigate the rural workforce actions and choice of dental practitioners on individual and collective levels. It understands the meanings behind dental practitioners' rural practice decisions, using their own explanations, experiences and opinions. Grounded theory emphasizes this, by investigating what people are doing and why (Charmaz 2006: 2-3). Grounded theory illustrates the relationships between concepts of life experience and life expectation and aims to understand and explain them in relation to rural practice decisions. The study moved between data collection and conceptualisation, using the end conclusions from the qualitative section to form a survey. Grounded theory is one of the most commonly used approaches to coding (Gibbs 2007: 1).

3.12 Coding

Thematic analysis categorises into codes, the themes within the accounts or aspects of accounts that were told to the researcher. The data analysis for both thematic analysis and grounded theory rely on coding (Sbaraini, Carter et al. 2011). Coding is the process of breaking data down into smaller components and labelling the components and comparing them, to understand and explain variation in the data (Sbaraini, Carter et al. 2011). Charmaz (2006: 43) describes coding as the pivotal link between collecting data and developing an emergent theory to explain the data. It involves identifying and recording passages of text that in some sense exemplify the same theoretical descriptive idea (Gibbs 2007). Passages of text that represent the same idea are coded together to develop a thematic idea framework. Analysis can then be conducted by either comparing code frequency, identifying code co-occurrence, or graphically displaying relationships between codes within the data (Guest, MacQueen et al. 2012: 10). The codes are applied to paragraphs of text, not individual words, so the meaning is associated with defining the data items rather than analysing the use of particular words (Guest, MacQueen et al. 2012: 10).

The researcher carefully reads the interview transcripts, applying a paraphrase or label (a 'code') that describes what they have interpreted in the passage as important (Gale, Heath et al. 2013). Coding involves: initial coding: the researcher generates as many ideas as possible inductively from the early data, and focused coding: the researcher pursues a selected set of central codes throughout the entire dataset and the study (Sbaraini, Carter et al. 2011). Focused

coding requires decisions about which of the initial codes are the most important and which contribute the most to the analysis (Sbaraini, Carter et al. 2011).

The data were coded into NVivo 10, the qualitative data analysis computer software program to achieve this process allowing for easy retrieval and identification. NVivo software allows the researcher to store, code, and retrieve transcribed interviews, researcher ideas and comments, or even photographs (QSR International Pty Ltd. 2015).

3.13 Validity

Validity and reliability are the terms used to explain the objectivity and credibility of research. Qualitative researchers are concerned about each while designing a study, analysing results and judging the quality of their study (Patton 2002: 20). Lincoln and Guba, (1985) explained qualitative research rigor as

> *"How can an inquirer persuade his or her audiences (including self) that the findings of an inquiry are worth paying attention to, worth taking account of?" (Lincoln and Guba 1985: 290)*
>
> *"Without rigor, research is worthless, becomes fiction, and loses its utility." (Morse, Barrett et al. 2002: 14)*

Validity of research refers to how sound the research is. Validity is more important than reliability (Guest, MacQueen et al. 2012: 79). If the data is valid, it is also by default reliable. The researcher checks for the accuracy of the findings by employing certain procedures (Cresswell 2014: 251). It is a measure of the strength of the design and the research methods used to answer the research questions. Validity concerns the interpretation of the data and whether the inferences made by the researcher are supported by the data and are sensible within the knowledge outlined in previous research (Peräkylä 2011: 365). In qualitative research, validity involves meticulous testing and consideration of the truthfulness of analysis and results (Peräkylä 2011: 368). There are key terms related to the validity of research: trustworthiness, authenticity and credibility (Cresswell 2014: 251), and processes used to ensure validity are different depending on the type of data on which the research is based (Peräkylä 2011: 367).

For this study, the recorded audio of the interviews were transcribed verbatim into Word, and coded and analysed using NVivo 10 using the true transcripts of the participants. The coding process utilised memos and constant internal comparisons to avoid a shift in their meaning. Problems can arise in qualitative research related to miscommunication (Carlson 2010). To prevent this, the qualitative process of member checking was conducted during some of the interview participants who were with particularly welcoming and enthusiastic.

3.13.1 Member checking

Member checking is an opportunity for participants to check and approve particular aspects of the interpretation of the data they provide (Carlson 2010). In this occurrence, the researcher restated and summarized certain topics then questioned the participant to determine accuracy. Participants with whom the researcher had developed strong rapport were asked to discuss some of the preliminary results using this approach at the completion of their interview, their personal comments were recorded in the transcripts. Member checks were also completed after the study by sharing the early findings with several other enthusiastic participants. This allowed participants to critically analyse the findings and make their own comments. The researcher also checked the interview transcripts for obvious mistakes made during the transcription process.

3.14 Reliability

Reliability of qualitative research refers to the researcher's approach being consistent across different researchers and projects (Gibbs 2007). The term has several different definitions, the key concept is consistency when repeating or comparing the study (Guest, MacQueen et al. 2012: 89). The validity and reliability of a study are closely linked. It is impossible to have a situation of high validity and low reliability (Guest, MacQueen et al. 2012: 89). However, if the data is valid, but does not yield similar results in subsequent studies, then it can be assumed that properties of the study's focus have changed. Kirk and Miller (1986: 41-42) identify three types of reliability referred to in quantitative research. The degree to which a measurement repeated remains the same, the stability of a measurement over time, and the similarity of measurements within a given time period.

The reliability of the qualitative research methods used in this study were addressed in several ways. The primary researcher was the only person conducting the interviews. This ensured consistency with the meanings devised from the interview transcripts. There was a second researcher employed with the task of independently reviewing several of the interview transcripts and coding the interviews into sample codes for comparison with those coded by the primary researcher. The coding was discussed between the primary and secondary researcher.

3.15 Quantitative approach [surveys]

This section describes the necessary steps undertaken in designing and developing the quantitative methods component for this research project. A brief overview of the second stage of the study, the quantitative approach is provided in the figure, (Figure 3-8). This figure itemises each step of the quantitative method used in the project, including the pilot study, data collection, data management and data analysis. Each stage of this process is explained in detail in the following sections.

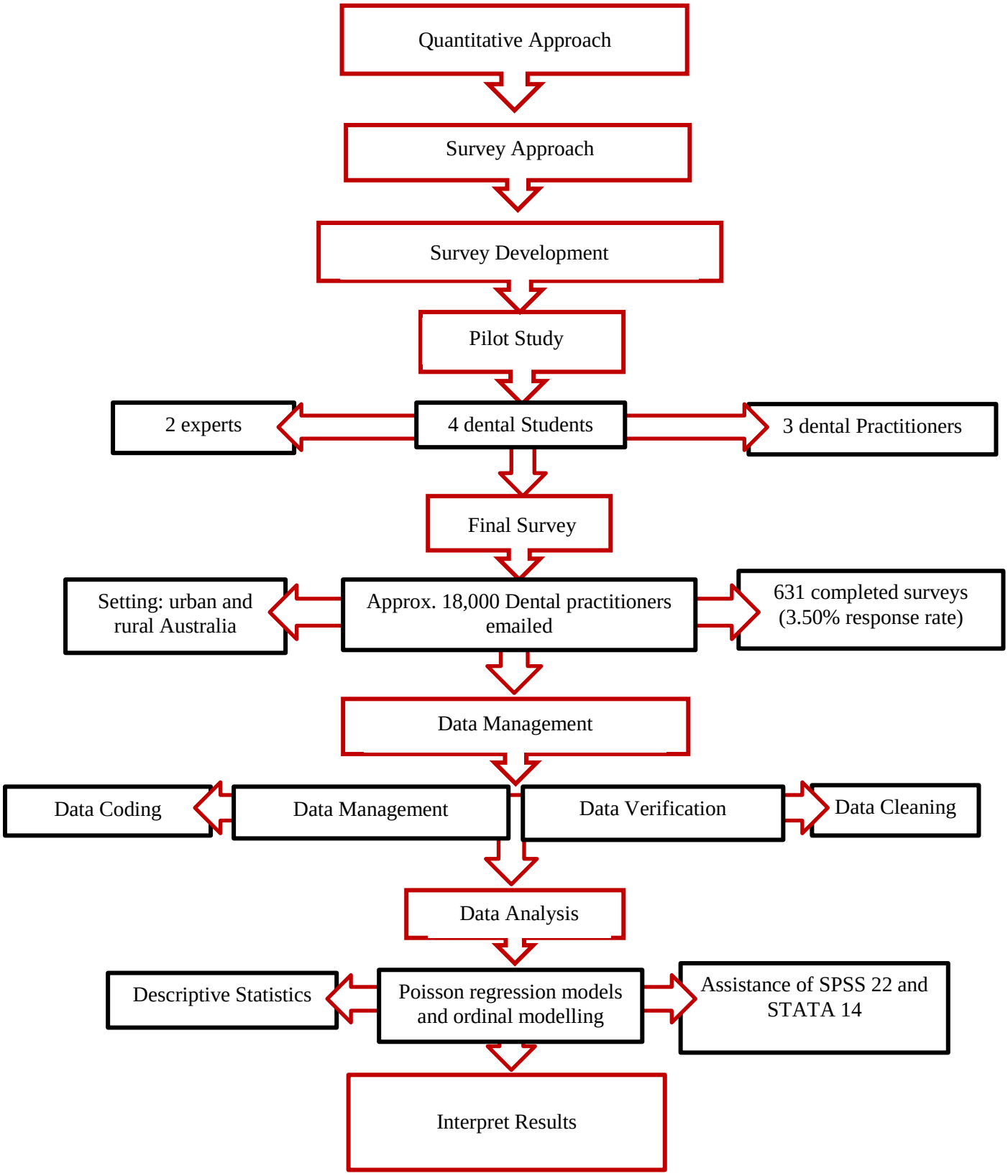

Figure 3-7: Outline of Quantitative Approach

3.16 Aims of surveys

This project used a mixed methods approach incorporating exploratory qualitative research followed by explanatory quantitative research. Qualitative research is often summarized as a tool to generate hypotheses, while quantitative research tests hypotheses (Morgan 2015). The goal of the quantitative component is to measure and analyse casual relationships between variables (Denzin and Lincoln 1994). Findings from the interviews and issues addressed in the literature from the review were used to design the survey. Surveys are very well suited as a research tool for gathering data on public opinion (Babbie 2001: 253). The survey was developed after scoping interviews of 50 Australian dental practitioners were completed. The interviews were conducted with of 34 dentists, eight OHTs, and eight prosthetists. The distribution of practitioner type was representative of the dental workforce (see Table 3-5).

3.17 Survey questionnaires

Surveys were selected due to their proven usefulness and efficiency for learning about people's opinions and ideas (Dillman, Smyth et al. 2009: 3). Surveys allow researchers to estimate the characteristics of many through collection of data from only a few members of the population. Gathering the results from collected data of a sample of the population group, the researcher can generalise or draw inferences to the whole population without the expense of gathering data on the entire population (Cresswell 2014: 201).

3.17.1 Strengths of surveys

Using surveys in research allows the researcher to draw inferences from the results and apply them to the population. This research project used surveys due to their acknowledged research benefits.

3.17.1.1 Anonymity of the participants.

There were no concerns for the researcher that the issues raised would prove to be sensitive to participants. Nevertheless, in view of the relatively small general population of dental practitioners in Australia, and the focus of the project on the smaller number of them who practice in rural areas, the research team felt that participants might wish to remain unidentifiable as participants. Survey respondents can rely on anonymity. Participants are more

likely to answer sensitive questions on an online or postal survey rather than having to speak to another person. Surveys conducted anonymously allow respondents to give answers that are more honest. Anonymity provides freedom from responding in socially acceptable ways than other types of research methodologies. Surveys must clearly state that answers will remain completely anonymous.

3.17.1.2 Ease of participation

Practitioners can participate at home, or at their place of business, at a time of convenience, in their own time, and at their own pace. Surveys are useful in describing the characteristics of large populations such as the dental practitioner workforce who are renowned for being time poor, busy, and reluctant research participants.

3.17.1.3 Low cost

Surveys are relatively inexpensive (Greenlaw and Brown-Welty 2009). Online surveys especially have a very small cost per respondent. That was a factor because this study's target population was high and the number of potential responses could be up to two thousand.

3.17.1.4 Ease of administration

Surveys are relatively easy to administer, and can be administered in varied and flexible ways, including online or via post. They are particularly effective when potential participants are dispersed over large geographical areas or are hard to reach. Researchers can also use mixed methods approaches to survey research, with online and postal surveys used to widen the scope of data collection.

3.17.2 Limitations of surveys

Despite the strong argument for surveys being selected as the data collection method for this stage, surveys do have some limitations. Deciding upon the best data collection method for quantitative data is extremely important. Unfortunately, in the real world, there is no perfect method. The best a researcher can hope for is optimal given the advantages and disadvantages of the methods available to them.

3.17.2.1 Non-response bias

Despite their important research benefits, surveys have declining response proportions (Galea and Tracy 2007). Unless response proportions are high, the data cannot be considered representative of the population (Fink, 1995: 36). The biases introduced by non-response can invalidate the survey results should the non-respondents differ from the respondents and bias measures of association between study factors if relationships between those factors differ between non-respondents and respondents.

3.17.2.2 Survey length

Surveys must not be too long to induce participant boredom or frustration.

3.17.2.3 Information bias

Respondents can interpret questions differently or subjectively leading to random or systematic error. Surveys aim to produce information and knowledge that accurately reflects the views and opinions of its focus population, but they are susceptible to four types of error (Dillman, Smyth et al. 2009: 123). Groves outlines coverage, sampling, nonresponse and measurement as the sources of error (Groves 1989). All were relevant to this study. These limitations are discussed in further detail.

3.17.2.4 Coverage error

Coverage error occurs when not all members of the population have a known chance of being included in the selected survey sample, and when those members who have been excluded are different to those included (Dillman, Smyth et al. 2009: 43). This leads to a type of bias known as selection bias (Sackett 1979). This can occur when the method of survey access is not appropriate for all members of the population. For example, an online survey would have incomplete coverage if a significant number of the population do not have access to a computer or to the internet. It can occur if the sampling frame does not include all members of the population. For example, a membership list maintained by a professional association would not be complete if not all registered dental practitioners are members of their professional association, or if the membership details recorded are inaccurate.

3.17.2.5 Sampling error

Surveys are undertaken in samples of the population when it is infeasible to survey every member of the population. Sampling error occurs because not every member of the population is sampled (Dillman, Smyth et al. 2009: 55). A consequence of this type of error is that the precision of the survey estimated is reduced when sampling error is high. This error may be random (non-differential), in which case it may result in weakening of measures of association. For example, the differences between mean values of a study factor for the urban and rural dental workforce may be reduced. Alternatively, if the error is systematic (differential) in the sense that responders and non-responders differ in mean values of a study factor or in their associations between study factors, bias will result. For example, in a survey that focuses on views and opinions about rural dental practitioners.

3.17.2.6 Nonresponse error

Nonresponse error occurs when there are members of the study sample who do not respond to the survey and they are in some way different to those who do respond and that the difference is important to the study (Dillman, Smyth et al. 2009: 16). For example, in a survey which focuses on the views and opinions about rural practice, those members who have a vested interest in rural practice, such as those who currently work and live in rural areas may be more likely to respond than members who do not have experience or interest in rural practice. There are several motivational techniques used to minimise nonresponse error. These include motivating all members to respond by offering participation rewards, compensation or altruistic approaches.

3.17.2.7 Measurement error

Measurement error in a questionnaire survey occurs when the respondent's answers to the questions are inaccurate (Dillman, Smyth et al. 2009: 18). Again the error may be random (non-differential) weakening measures of association, or systematic (differential) resulting in bias. This often occurs as a result of poorly worded questions so that the participants do not fully understand what a particular question is asking. If the survey is self-administered either online or via mail, participants do not have an avenue to ask questions to the researchers if they have a query with the survey. This means the wording of each individual question is extremely important in order for the survey to gather reliable and accurate data.

Despite these limitations, a survey was selected as the method for collecting data for this study. The next issue to consider is the method by which the survey would be administered, either by post or online.

3.18 Mode of administration

One option for administering the survey was to do so by personal interview. This was not a feasible option, given the geographical diversity of the dental workforce and the limited resources available to the candidate. A decision to use personal interviewing would have resulted in a much smaller sample and limited geographical coverage. This left two options for mode of administration: either by post or online. There are positive and negative aspects each method.

Postal surveys have traditionally been used to assess the knowledge, views and attitudes of health professionals to inform service planning and provision (Braithwaite, Emery et al. 2003). In the UK, for example, a shift in emphasis on a primary care-led NHS has increased the number of questionnaires received by health professionals, and this has led to response rate reduction (McAvoy and Kaner 1996). Senior ADA administration staff suggested that this could also be a concern with surveys of Australian dental practitioners.

Internet-based research is growing in popularity. Online surveys have a much lower time impost and monetary cost than postal surveys. They do no incur costs of paper, printing, envelopes or postage including pre-paid return postage. Online surveys require participants to donate their time to completing the survey, but not to handling it. Posted surveys also require handling time by research staff because the hard copies of each survey must be printed, collected, and folded by hand into envelopes, addressed and posted. Online surveys can be easily edited and modified using the survey software should a revision be required. Postal surveys are less amenable to rapid revision. Online surveys have particular advantaged when the areas to be surveyed are geographically large; the research team is able to access the email of eligible subjects, those potential participants have access to computers and the internet, and they have appropriate computer literacy levels adequate to navigate an online survey (Fink 2013: 47).

For these reasons, online surveys were deemed to be the most appropriate survey method for this study. All Australian states and territories were to be surveyed, including very remote and geographically isolated areas. There were high monetary and time costs involved in postal surveys of this scale.

The costs of administering and posting the required number of postal surveys was considered to be very high. There were also issues with the amount of time required to find professional or personal addresses of dental practitioners around Australia.

There are confidentiality concerns associated with accessing this information, and while the practice addresses were listed in electronic and book-based business listings, the time required to compile a complete listing would be great. Email addresses were used instead. This allowed communication between the researchers and the study population at minimal cost or loss of time. The email communications were undertaken on behalf of the researchers by the four professional dental associations. These emails became the principal mode of communication between researcher and study population. Given their profession and associated education levels, dental practitioners were considered highly likely to be computer literate, to have access to computers in either their workplace or home, and to have access to the internet. Initially it was considered possible that the older members of the dental practitioner population may not have access to the internet and computers. However, during the qualitative interviews, many practitioners mentioned using online software for accessing continuing professional development, professional support and networking, and social communication. This was most common for rural and remote practitioners due to their geographical isolation. The University of Tasmania also had a licence for 'LimeSurvey' *TM*, a survey service-platform to prepare, run and evaluate on-line surveys (LimeSurvey 2015).

3.19 Survey structure

The purpose of the survey was to obtain information with which to test the quantitative research in relation to the possible rural practice recruitment and retention motivators.

Hypothesis: (a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so this will be more pronounced for female dental practitioners than for male dental practitioners.

The research hypothesis emanated from the findings of the qualitative section of this study.

The questionnaire consisted of five parts, with each focusing on a different aspect of the participants.

Part A (Questions 1 to 16): Focused on the background, demographics, and professional information of the participant. This information sought included basic demographic details such as age and sex; background information such as birthplace, location of birth; and professional information such as work location, profession, and usual hours of work.

Part B (Question 17): Asked participants to rate the importance of factors that could affect their decision to move to a rural area. This question sought information about rural recruitment.

Part C (Question 18): Asked participants to rate the importance of factors that could affect their decision to stay in a rural area. This question sought information about rural retention.

Part D (Question 19): Asked participants to rate the importance of factors that could affect their decision to stay in a rural area. This question sought information about rural turnover.

Part E (Question 20 and 21): Asked participants to add comment on their own ideas regarding rural recruitment and retention. This focused on what government and stakeholders could do through policies or incentives, and sought to elicit suggestions on improving rural recruitment and retention.

3.20 Power calculations

One of the purposes of quantitative research methods is information collected from smaller sample groups of people to make statistical inferences about larger groups that would be expensive to study in their entirety (Holton and Burnett 1997: 71). Therefore, how large should the sample be in order to be able to infer the research findings to the whole population?

Statistical inference involves testing a "null" hypothesis by seeking to nullify it with evidence to the contrary. The null hypothesis is a claim about a population characteristic (for example, the proportion of dental practitioners who practice in rural areas) or about an association between population characteristics (for example, whether the proportion of dental practitioners with a rural background is higher among those who practice in rural areas than it is among those who practice in urban areas). By statistical convention, the null hypothesis is that the observed phenomena occurred by chance.

Hypothesis testing is inexact, with two main types of error possible. A type I error is to reject the null hypothesis when it is correct (a "false positive"), while a type II error is to accept the null hypothesis when it is not correct (a "false negative"). The relative gravity of the two types of error differs according to the consequences of each type of error. When an incorrect action has consequences more dire than the consequences of inaction, type 1 error is the more serious type of error and its probability of occurrence is stringently controlled. An upper limit of 5% might be the maximum that is allowed.

For a fixed sample size, a reduction in probability of type I error occurs at the cost of increased probability of type II error. To reduce the probability of type II error when the maximum allowable probability of type I error is set at 5%, it is necessary to increase the sample size. There are formulae available to calculate the sample size that results in a particular probability of type II error at a specified maximum probability of type I error. The probability of type II error may be set at 20% (typical in observational studies), or 10% (common in experimental studies particularly in randomised controlled trials funded by pharmaceutical companies), or such other value as the investigator determines. The power of a study is the complement in probability of the probability of type II error. For example, if the probability of type II error is 0.2 or 20%, its complement in probability is $1 - 0.2 = 0.8$ or 80% and the study is said to have 80% power to avoid type II error.

The power calculations were based on data in the qualitative study involving 50 Australian dental practitioners. They comprised 34 dentists, 8 prosthetists and 8 therapists/hygienists/oral health therapists. The sample was approximately representative in occupational type of the current make-up of Australian dental practitioners. The interviews were semi-structured, one-

on-one interviews conducted as question-and-answer phone conversations. The most recent workforce numbers for registered dental practitioners, by practitioner type were estimated using Dental Board of Australia 2015 data (see Table 3-6).

Table 3-6: Registered dental practitioners, by practitioner type using Dental Board of Australia 2015 data

Practitioner type	
Dentist	15,937
Oral health therapists	1,169
Dental hygienists	1,866
Dental therapists	1,063
Dental prosthetists	1,253
Total	21, 288

Membership in the professional association groups is voluntary. The ADA estimates their membership numbers to comprise of over 90% of dentists in Australia. The Australian Institute of Health and Welfare (Australian Institute of Health and Welfare 2014) found that there were 15,933 registered dentists in Australia in 2015. The ADA told the research team that they held email address contact information for approximately 70% of their members. Given these numbers, we estimate that the ADA's membership was approximately 13,218 practitioners and that they had email addresses for 10,037 of them. Similar calculations were conducted for the other professional associations and are outlined in the table, (see Table 3-7).

Table 3-7: Registered dental practitioners, by practitioner type and approximate membership and email contact listing using DBA 2015 data.

Practitioner type	Number Registered	Membership	Email contact	Response rate	
Dentist	15,937	14,343	10,040	2108	
Oral health therapists	1,169	1,052	736	154	
Dental hygienists	1,866	1,679	1175	247	542
Dental therapists	1,063	957	670	141	
Dental prosthetists	1,253	1,128	790	166	
Total	21,288	19,159	13,411	2816	

Assuming that 21% of dentists, and 21% of oral health therapists, dental hygienists, dental therapists (OHTs) and dental prosthetists would agree to participate in the study after being approached, the sample was expected to consist of approximately 2108 dentists, 542 OHTs, and 166 prosthetists; n=2816 in total.

Power was estimated using the approach of Kahn and Sempos (Kahn and Sempos 1989) and allow for a two-sided probability of type 1 error of 5% (α=0.05). The calculations were made using the estimated coefficient and the estimated standard error of the relevant predictor in a log binomial regression model (a generalised linear model with binomial errors and log link). The outcome indicator for each regression model was a binary (0/1) term for urban/rural location of the practitioner's practice (urban=0, rural=1). The predictor was:

- a binary (0/1) covariate for having lived in rural areas prior to qualifying as a dental practitioner [Hypothesis 1(a)]; or

- a binary (0/1) product term formed to test whether there was difference by practitioner sex (male=0, female=1) in the estimated effect of having lived in rural areas prior to qualifying as a dental practitioner [Hypothesis 1(b)].

The regression model was fitted to the interview data (n=50) expanded to size n=2000 (dentists), n=500 (OHTs) or n=2500 (all dental practitioners) by replicating a sufficient number of times each of the 50 observations. This procedure is equivalent to the standard approach of assuming that the proportions found in pilot data will be exactly replicated in the larger main study, but it has the advantage of allowing power to be estimated for hypotheses involving statistical interaction – Hypothesis 1(b) – in a straightforward way.

3.20.1.1 Hypothesis

Hypothesis 1: (a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so this will be more pronounced for female dental practitioners than for male dental practitioners.

In the interviews, dental practitioners now practising in rural areas included 19% (5/27) of those who had lived in rural areas and 17% (4/23) of those who had not lived in rural areas. If these percentages are replicated in the main study, there will be almost no prospect of detecting the difference between the two groups postulated under Hypothesis 1(a). Power to do so is 0.04 (dentists), 0.03 (OHTs) and 0.04 (both groups combined).

As expected, however, the postulated positive influence of having lived in rural areas was markedly stronger for female practitioners than for male practitioners. Female dental practitioners now practising in rural areas included 29% (4/14) of those who had lived in rural areas but only 13% (1/8) of those who had not lived in rural areas. If these percentages are replicated in the main study, there will be excellent prospects of detecting the sex difference in effects postulated under Hypothesis 1(b). Power to do so is 0.99 (dentists), 0.96 (OHTs) and 1.00 (both groups combined).

If the interview data provided a reasonably accurate indication of what will be found in the main study, the proposed sample size will provide good-to-excellent prospects of detecting the differences postulated in Hypothesis 1(b).

3.20.2 Pilot Study

A pilot study is the process by which the proposed survey questionnaire and the procedures of implementation are tested on a small sample of the study population (Dillman, Smyth et al. 2009: 228). It is common practice to evaluate the suitability of survey questionnaire, prior to field administration (Willis, Schechter et al. 1999). Pilot studies are crucial for good study design. A pilot study can not guarantee success in the main study, but it can result in improvements and refinements that increase the likelihood of success (Van Teijlingen and Hundley 2001). The first step was to conduct an expert review of the questionnaire.

3.20.3 Expert review

This technique for pre-testing the survey involved experts in the field of research using their knowledge and expertise to critically appraise the sampling/recruitment procedures and/or questionnaire. The process of expert review is common practice in survey questionnaire development, with the objective of improving the quality of the questionnaire (Willis, Schechter et al. 1999). The researchers identified two individuals each with expertise relevant to the field and requested them to review the questionnaire. A brief outline to the study and a copy of the draft survey questionnaire were sent to the experts via email.

Comments and suggestions from the experts were provided via return emails, and phone conversations. The comments related to the precise wording of the questions. For example, the experts recommended rewording the question related to location of previous schooling to make clearer what information was sought. There were also suggestions to simplify the response options for some questions by using symbols (<,>) instead of lengthen phrases. Another suggestion was for an additional background question about the university that participants had attended.

3.20.4 Pre-testing the questionnaire with dental practitioners

The next stage of the pilot study was to pre-test the questionnaire with dental practitioners. This was a ‘trial run’ of the survey instrument (Baker 1994: 182-183) to test whether members of the study population can understand and correctly interpret the questions. The process identifies questions that require rephrasing or modifying and issues with the construction of the survey

instrument. The testing was undertaken at Oral Health Services, New Town, Tasmania at 8:30am Thursday 30th October. There were seven participants. Four were final year dental students from the University of Queensland, one was an oral health therapist, and two were senior dentists working at the institution. The participants were invited to complete the survey and to make any suggestions or comments they felt relevant. The participants were given hard copies of the survey and comment sheets on which to provide their feedback. The time taken to complete the survey was also recorded for quality assurance purposes.

The testing was conducted in the presence of the researcher. The feedback included suggestion for re-structuring the questionnaire to place questions on recruitment factors before questions on retention factors, and to place questions on retention factors before questions on turnover factors. Another suggestions was to simplify the language and make it more concise. The sentences were changed to "The next section is investigating the factors which influence your work location movement decisions, it will be somewhat repetitive, but it aims to discover which factors are positive and negative for yourself depending on the nature of the decision." In addition, section headings to more clearly delineate the parts of the questionnaire were added in response to comments received. These additions outlined the reasons for the repetition in the questions, the precise differences between each of the questions, and the focus of each of the questions. The research team felt that these changes could ease participant burden and improve understanding of the survey. The participants reported that they were happy with the length of the survey, which took between 10 – 15 minutes to complete.

3.21 Final draft of questionnaire

The final draft of the survey questionnaire was completed after the completion of the pilot study. The questionnaire consisted of 21 questions divided into five sections. An outline of the final survey is presented in the table that follows (see Table 3-8).

Table 3-8: Final survey outline

Section A. Background	Questions 1-16
	Sex Place of birth Residential status Location of last two years of school Location of dental school Family status What is your profession Age group Where do you work How long have you been at your current practice Postcode of practice Name of town Average hours worked per week HECS Rural clinical placement Ever worked or considered working in rural area
Section B. Recruitment factors	Question 17
	Factors influencing rural recruitment Rate the importance of factors that could affect your decision to move to a rural area. Share your comments on factors influencing dental practitioners' decisions on whether to move to a rural area.
Section C. Retention factors	Question 18
	Factors influencing rural retention Rate the importance of factors that could affect your decision to stay in a rural area. Share your comments on factors influencing dental practitioners' decisions on whether to stay in a rural area.
Section D. Turnover factors	Question 19
	Factors influencing rural turnover Rate the importance of factors that could affect your decision to leave a rural area. Share your comments on factors influencing dental practitioners' decisions on whether to leave a rural area.
Section E. Comments	Questions 20-21
	What can the Government/s and other stakeholders do to encourage dental practitioners to move to and stay in rural areas. Please share with us your comments or suggestions for improving recruitment and retention of the Australian rural dental workforce.

3.21.1 Sampling methods

There are many different methods of sampling a subset of individual elements from a study population to estimate characteristics of the population. All unbiased methods require that every element has a known (non-zero) probability of being selected, and that the sampling involves random selection at some state of the process.

3.21.2 Simple random sampling

Simple random sampling is the most common method of sampling used for self-administered surveys (Dillman, Smyth et al. 2009: 55). In simple random sampling, each member of the target population has an equal (non-zero) chance of being selected, and those selected are chosen entirely by chance. This process of randomisation would, on average (ie. not necessarily on any specific draw yield), a representative sample from the population that provides the researchers with the ability to generalise to the whole population (Cresswell 2014: 204). When the target population is large it becomes more difficult to draw a random sample (Cresswell 2014: 204), unless a comprehensive sampling frame of the population is available. The issue results from difficulty in identifying every member of the target population in order to randomly sample individual subjects. In the absence of a comprehensive sampling frame, random sampling is an expensive and time consuming technique for one researcher to accomplish. Consider the task of taking a random sample of dental practitioners. The target population of dental practitioners comprises approximately 19,462 persons (Australian Institute of Health and Welfare 2014). In the absence of an accessible comprehensive list of dental practitioners, simple random sampling is infeasible. The best that a researcher could hope for is that the professional dental associations maintain lists of their members, that these lists include virtually every dental practitioner, and that each professional body makes its list available to the researcher.

3.21.3 Cluster sampling

Cluster sampling is used when it is impractical to create such an exhaustive list of the elements making up the target population (Babbie 2001: 215), which for this study was the dental practitioner workforce in Australia. Cluster sampling involves selecting entire groups of the population or sampling from those groups, and where the groups are selected by some form of random sampling. For example, dental practitioners are generally listed in telephone directories.

Compiling a list of all dental practitioners from telephone directories would be arduous, but it may be feasible to first select telephone districts and compile a list of dental practitioners for each selected district.

When the population is or can be divided into mutually exclusive sub-groups or strata, it may be administratively convenient to sample the elements or clusters within the strata. This form of sampling is referred to as stratified sampling. It has the advantage of reducing sampling error if measurements within strata have smaller standard (are most similar) than measurements between strata. If so, the strata are relatively homogenous sub-groups that cannot be excluded by chance from the sample (hence reduced sampling error). For example, criteria for separating dental practitioners into strata could be the ASGC-RA classification of their main practice location. Once this is done, the next step is to take a random sample of elements or clusters from within each stratum or remoteness area.

3.21.4 Convenience sampling

Convenience sampling is not a form of random sampling. It is a last resort method best reserved for sampling difficult-to-ascertain populations such as injecting drug users. Because methods of statistical analysis and inference assume that the observations in the sample data have a known (non-zero) probability of inclusion in the sample, they are not valid when used with convenience sampling.

This survey was unable to use random sampling due to privacy concerns and it was not feasible to use cluster sampling or to stratify the sample. Instead emails were sent to every member of the professional dental associations, and all were invited to participate. Privacy concerns will be discussed further.

3.22 Survey criteria

The selection criteria for participation in the online survey are displayed in the table that follows (see Table 3-10).

Table 3-9: Inclusion and exclusion criteria for survey participants

Criterion	Inclusion	Exclusion
Sex	Males Females	None
Age range	Must be over 18 years of age to participate in the study	Individuals under 18 years of age
Type of dental practitioner	Dentist, Dental hygienist, Dental therapist, Dental prosthetists, Oral health therapist	Dental technician Dental assistant
Place of training	Australia Overseas	None
Location of practice	Urban Rural	None
Membership in a professional association	Australian Dental Association (ADA) Australian Dental Prosthetists Association (ADPA) Australian Dental and Oral Health Therapists Association (ADOHTA) Dental Hygienists Association of Australia (DHAA)	Non-members

3.23 The assistance provided by professional dental associations

The survey participants were recruited with the assistance of the four main professional dental associations. They provided lists of registered dental practitioners that are not available through traditional channels. Similar to the recruitment of the professional dental associations for the interviews. Responsible offices of the ADA, ADPA, ADOHTA and DHAA were contacted via

email initially, and then by telephone. In the case of the ADA, one face to face meeting was arranged to discuss concerns with the project that had been raised. This required a professional relationship to be established between the researcher and the responsible offices of the associations. Once contact was made, and an email response was received from each of the associations, follow up phone calls were initiated, and further information was provided to each association. The first step was an updated email, restating the importance and purpose of the study. Alongside these emails were attachments were a letter of introduction. The research team requested access to their membership lists for sampling. There were several defining concerns for the study.

3.23.1 ADA

The ADA held personal and identifying information on its members and its chief executive officer considered that revealing any kind of information to outside parties would be a breach of privilege. The ADA refused to provide the researcher with membership lists, or any kind of identifying information on their approximately 11,000 registered members. The research team requested access to their membership email lists, but this was rejected. The research team requested to place a research assistant in their national office to conduct stratified random sampling from their membership list, but this was also rejected. The ADA would advertise the survey through its e-communication channels, provided this was first approved by its Federal Executive Council and the outcomes of the survey were made directly available to ADA. The outcome of the Federal Executive Meeting was confirmation that membership lists could not be disclosed due to privacy laws, and that the ADA was unable to assist with follow up contact of members who had not responded for privacy reasons. The assistance the ADA could provide would be to advertise the survey through the ADA e-channels.

Due to time and cost constraints, and fear that the ADA would retract its preliminary support, the research team suggested that the ADA help by forwarding invitation emails to their members with a link to the survey via Lime Survey software. ADA administration forwarded the email to their members through their electronic membership system without breaching confidentiality issues. The ADA requested to draft their own letter to members. The changes made resulted in a three page letter being sent to members. It updated them on recent ADA

activity, including an introduction on ‘Dental tourism’ and a feature on workforce numbers and the changes to the Skilled Occupation List (SOL). The survey link was included at the end of the letter.

The president of the ADA Dr Rick Olive was contacted directly by the research team to ask for his support. He expressed willingness to help, but was constrained in what he was able to provide. With time constraints a limiting factor, eventually it was decided to proceed with the survey with ADA involvement in its distribution limited in this way. Finally, in March 2015, an ADA administration assistant was able to provide help with the formal rollout process for the survey. In late April 2015, upon request for a follow up email to be sent to their members, the ADA was unable to assist because a reminder email would clash with already scheduled electronic direct mail (eDMs) from their federal office.

3.23.2 ADPA

The ADPA is a relatively small professional association in comparison to the ADA. The chief executive officer of the ADPA was not able to access a national membership databases. The membership communication systems of the ADPA are maintained on a state level, by volunteers, and there is no national database of members available for national email distribution. Each of the state presidents was contacted separately by email. The researcher called and sent letters to the ACT president, whose email address was not listed online. There was not a state ADPA for the Northern Territory.

The researcher received offers of help from Queensland, Tasmania, New South Wales, and South Australia. There was no response from Western Australia, ACT or Victoria. The responding state bodies were sent invitation emails to forward on to their members independently of the research team in the same way the ADA members were contacted for the survey. The email included a link to the survey via Lime Survey software. This method of contact did not breach confidentiality. The ADPA state presidents were also offered the opportunity to revise the introductory email and the letter to their members. None of the state presidents revised the wording of the email.

3.23.3 DHAA and ADHOTA

The DHAA and ADHOTA were also contacted requesting their assistance with the study in the same way. Emails with links to the survey were sent to the presidents of each association for forwarding on to their members independently of the research team. Once again, this was done without breaching confidentiality issues. The DHAA nor ADHOTA did not request revisions to the introductory email and letter to their members.

3.24 Coverage of the dental practitioner workforce

The coverage of dental practitioners by the four main dental practitioner associations is summarised in the table, (see Table 3-10).

Table 3-10: Registered dental practitioners, by practitioner type and approximate membership and email contact listing using DBA 2015 data.

Practitioner type	Number Registered	Membership	Email contact
Dentist	15,937	14,343	10,040
Oral health therapists	1,169	1,052	736
Dental hygienists	1,866	1,679	1175
Dental therapists	1,063	957	670
Dental prosthetists	1,253	1,128	790
Total	21,288	19,159	13,411

The professional dental associations are the key representative bodies for dental practitioners in Australia, but membership is voluntary. The ADA estimates that approximately 90% of dentists in Australia are members of their association (Australian Dental Association Inc. 2015), and they had email addresses for about 70% of their members. It is reasonable to assume that around 90% of the approximately 4,000 registered oral health therapists, dental therapists, dental hygienists, and dental prosthetists are members of the ADPA, ADHOTA, and DHAA, and that the associations have email addresses for around 70% of their members. Hence, it can be estimated that emails were sent to approximately 11,300 prospective participants. The survey was also available via post for those who did not wish to complete it online, and for prosthetists in WA, NT, ACT and Victoria. Approximately 200 postal surveys were distributed, but only 3 were completed and returned.

3.25 Data management

Data management is an important aspect of quantitative research methods. The research data were compiled from the completed survey questionnaires.

3.25.1 Data entry

The data entry was conducted by the researcher under the direction of a supervisor (a senior biostatistician) with relevant expertise in the area. The data from the surveys were directly downloaded from Lime Survey hosted software into an Excel spreadsheet and converted into a SPSS (Statistical Package for the Social Sciences, version 22) dataset.

3.25.2 Data cleaning

Data cleaning is an essential step in data processing. It is the process of detecting and correcting data entry and coding errors in the data base. No matter how the data have been entered, it is inevitable for some errors to remain (Babbie 2001: 415). The data cleaning process demands careful consideration because data errors can significantly affect the final results. There are two types of cleaning: possible-code cleaning and contingency cleaning. Possible code cleaning is the process of checking to see that only possible codes assigned to particular attributes appear in the data base (Babbie 2001: 415). This is used to identify outliers and errors in the data. Contingency cleaning is the process if checking to see that only the cases that should have data on a particular variable do have that data (Babbie 2001: 418). In SPSS, data cleaning is the process of consistency checks and treatment of missing responses. Consistency checks can identify values that are out of range, logically inconsistent or have extreme values. Using SPSS software, this is done by reviewing a summary of the distribution of the data provided by descriptive statistics of each variable one at a time. The researcher can access the data ranges (mean, standard deviation, minimum, maximum, kurtosis, and skewness) for each variable. Graphs and histograms are also useful for a pictorial demonstration of the data ranges for each variable. Scatterfolds of pairs of variables can reveal implausible values not obvious when each variable is viewed in isolation. Consistency checks also include testing the logic of data.

3.25.3 Quantitative data analysis

Data analysis is the process of systematically applying statistical analysis techniques to describe and evaluate data. The previous sections have described how the data were collected. This section will describe the manner in which the data were analysed using quantitative techniques. The data analysis includes both descriptive statistics and inferential statistics to analyse the responses. Descriptive statistics provide the reader with a summary of the data in a form that is easy to read and understand (Halfens and Meijers 2013). These methods use graphical techniques and numerical measures such as means and median to summarise the distribution of the data. Once the data has been sufficiently described, inferential statistics is used to draw conclusions about characteristics of the population from which the sample is drawn (Halfens and Meijers 2013). For example, this will allow the researcher to draw inferences about the key factors that motivate dental practitioners to rural practice in rural areas. Analysis of the survey results to determine evidence of the RBE used log binomial regression models (a generalised linear model with binomial errors and log link) and Poisson regression.

Data analysis to identify the factors influencing Australian dental practitioners' decisions on rural practice recruitment, retention and turnover were undertaken using SPSS version 22, and STATA version 14. Ordinal log multinomial regression (Blizzard, Quinn et al. 2013) using a forwards-descending adjacent categories model was used to estimate association of rural practice with the five ordered levels of respondent ratings of the importance potentially influencing recruitment, retention, and turnover in dental practice in Australian rural areas. The responses were ordered on a rating scale utilising five levels of importance: 'very important', 'important', 'neutral', 'unimportant', and 'not at all important'. The covariate was a binary term for rural practice computed from the postcode of the respondent's primary practice location to determine the ASGC-RA category (Australian Government Department of Health and Ageing 2012) of the area where they work. This was then assigned either an 'urban' or a 'rural' classification by grouping ASGC-RA 1 (major cities) and 2 (inner regional) as 'urban', and ASGC-RA 3 (outer regional), 4 (remote) and 5 (very remote) as 'rural'.

Prevalence ratios with 95% confidence intervals are reported. These represent the probability of a rural-based practitioner relative to the probability of an urban practitioners advancing to a

level of lesser importance on each attitudinal scale. The attitudinal scales were categorised into four themes (work structures, workplace relations, financial issues, and lifestyle). The estimates are adjusted for age. Results are reported for men and women separately because there were some differences by sex in the estimated effects of rural location on the outcomes. The statistical significance of each interaction was assessed from the size of the regression coefficient relative to its standard error of a product term formed from the covariate for rural location and the covariate for sex. Differences by practitioner type (dichotomised as dentist/specialist vs dental therapist/dental hygienist/ prosthetists/oral health therapist) in the estimated effect of rural location were secondary to the differences by sex, and are not reported. The method of sampling involved incomplete ascertainment of the study population to the extent that dental practitioners are not members of a professional association or had not provided their email address to their association. The method of recruitment allowed limited contact or follow-up. The results from this quantitative data analysis are presented in **Chapter 5.**

Data analysis were undertaken using SPSS, Statistical Package for the Social Sciences, version 22. The dependent variable was rural practice computed from the postcode of the respondent's primary practice location to determine the ASGC-RA category (Australian Government Department of Health and Ageing 2012) of the area. This was then assigned either 'urban' or 'rural' classification. ASGC-RA 1 (major cities) and 2 (inner regional) were categorised as 'urban' and ASGC-RA 3 (outer regional), and 4 (remote) and 5 (very remote) as 'rural'. Rural background was categorised using each respondent's self-reported designation of birthplace, or if not available, the place of previous two years of schooling prior to entering training for a dental qualification. The categories used in analysis were Australian urban, Australian rural, and overseas.

Prevalence and prevalence ratios with 95% confidence intervals comparing demographic characteristics of participants were estimated using log binomial (Blizzard, Quinn et al. 2013) and Poisson regression. Factors with a statistically significant or at least moderately sized relationship with outcome were entered into mutually adjusted models. Statistical interaction was assessed from the co-efficient and standard error of a product term formed from the covariates of the two or more factors involved. The results from this quantitative data analysis are presented in **Chapter 6.**

3.26 Limitations of sampling and recruitment

There are several limitations to the methods used in this study due to privacy concerns. Together with the reluctance of dental practitioners to participate in surveys, this resulted in a low response proportion. Therefore, possibility of selection and non-response bias cannot be discounted.

3.26.1 Ethical considerations

Any research involving people requires thorough ethical consideration and approval from a committee able to approve and monitor social science research. The University of Tasmania must ensure that those conducting research are either adequately experienced and qualified, or supervised. Research ethics involving humans are concerned with four basic principles and values.

1. Integrity of the researcher and the research to be undertaken
2. Respect for people, their dignity and their rights
3. Beneficence, the obligation to maximise possible benefits and minimise possible harm
4. Justice, asking who ought to receive the benefits of research and bear its burden.

For this study, ethical approval was granted by the Social Science Human Research Ethics Committee (Tasmania). There is a copy of the ethics application, and amendments in the Appendix (see Appendix J and Appendix K). The privacy of participants was protected by coding. The audio files and word documents from the phone interviews and returned surveys were coded and made accessible only to the research team. They were stored in password-protected files on password-protected computers. Each of the phone interview documents was initially coded by the participant's first name, and then de-identified by converting the identifier to numerical codes based upon position in the list when the interview was conducted. Participants were given the opportunity to withdraw from the study and withdraw their data at any time within twenty eight [28] days of the interview. No participant took up this offer.

For the online surveys, respondents were allocated a code, based upon the sequence in which they logged into the survey. This code was not associated with any identifiable data. All information used in this study will be kept in a locked and secure filing cabinet, and data will be stored in password-protected electronic files on a server in the University of Tasmania, Department of Rural Health. The information and the data will be retained for at least five [5] years after the completion of the study.

3.27 Conclusions

This chapter has described the conceptual framework. The study combines both open-ended and closed research questions and benefits from using both qualitative and quantitative research design approaches to create a more meaningful and comprehensive study. Through a review of both qualitative and quantitative data collection techniques, the mixed methods approach to research design was developed using semi-structured interviews and self-administered online surveys. The advantages and disadvantages of the collection technique decisions were discussed and weighed for best overall outcome. A complete overview of the procedure of the study has been discussed in detail. The chapter has also illustrated the real world issues that arose in respect of the involvement of professional associations in identification and recruitment of participants.

4 VIEWS OF AUSTRALIAN DENTAL PRACTITIONERS TOWARDS RURAL RECRUITMENT AND RETENTION: A DESCRIPTIVE STUDY

4.1 Preface

This chapter addresses the first research question, and investigates the attitudes of Australian dental practitioners towards living and working in Australian rural areas.

All of the research contained within this chapter has been published as ***Godwin, D.*** *Hoang, H. & Crocombe, L. 2016. Views of Australian dental practitioners towards rural recruitment and retention: a descriptive study. BMC Oral Health, 16, 1-10.*

4.2 Background

Australia is one of the most sparsely populated countries in the world. People residing outside capital cities have poorer oral health and less favourable dental visiting patterns than their city counterparts (Crocombe, Stewart et al. 2010). The differences in visiting patterns may be due to difficulties with access as a result of an unbalanced distribution of dental practitioners between urban and rural areas in Australia (Crocombe, Stewart et al. 2010). Previous literature has investigated factors which influence rural recruitment and retention of the oral health workforce from Australia and around the world. Working rurally has been linked with desire for a rural lifestyle (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007), more challenging job opportunities (Kruger and Tennant 2005, Campbell, McAllister et al. 2012), wider range of patients and clinical exposures (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012), administrative and clinical experience (Bazen, Kruger et al. 2007, Hall, Garnett et al. 2007, Campbell, McAllister et al. 2012), an enjoyable patient base (Bazen, Kruger et al. 2007), financial incentives (Kruger, Smith et al. 2007, Campbell, McAllister et al. 2012), personal and professional supportive networks (Kruger and Tennant 2005, Daniels, VanLeit et al. 2007, Renner, Westfall et al. 2010, Campbell, McAllister et al. 2012, McFarland, Reinhardt

et al. 2012), and a sense of belonging to a community (Kruger and Tennant 2005, Hall, Garnett et al. 2007, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010, McFarland, Reinhardt et al. 2012). However, rural practitioners also experienced a range of negative factors which influenced their decisions to leave rural areas. These included professional and social isolation (Kruger and Tennant 2004, Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Campbell, McAllister et al. 2012), limited access to facilities and social activities (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007), increased workload and inadequate time off duty (Kruger and Tennant 2005, Hall, Garnett et al. 2007, Kruger, Smith et al. 2007), limited access to continuing professional development (Kruger, Smith et al. 2007, Campbell, McAllister et al. 2012), poor access to education services for children (Kruger and Tennant 2005, Richards, Farmer et al. 2005), limited job opportunities for their partner (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Renner, Westfall et al. 2010), their own or their family's dissatisfaction with rural lifestyle and failure to integrate into the rural community (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007, Kruger, Smith et al. 2007, Bazargan, Chi et al. 2010, Renner, Westfall et al. 2010). Previous studies have found that the most commonly identified indicator of rural practice was prior rural exposure (Hall, Garnett et al. 2007, McFarland, Reinhardt et al. 2012, Godwin, Hoang et al. 2014).

There have been strategies put in place aimed towards increasing recruitment of both private and public dental practitioners into the rural health workforce. They have included the use of foreign-trained dentists (Bazargan, Chi et al. 2010), student loan repayment schemes (Daniels, VanLeit et al. 2007, Bazargan, Chi et al. 2010, McFarland, Reinhardt et al. 2010, Renner, Westfall et al. 2010) and financial incentives (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007). Strategies aimed at increasing retention of rural dental practitioners included increasing the number of dental students at universities with rural upbringings (Silva, Phung et al. 2006, Grobler, Marais et al. 2009), rural clinical placement programs during undergraduate training (Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007, Grobler, Marais et al. 2009), and locating dental schools in rural areas (Grobler, Marais et al. 2009, McFarland, Reinhardt et al. 2010).

Despite many previous studies focusing on rural recruitment and retention of dental practitioners, a systematic review suggested that more comprehensive research could better investigate the issue by including all types of dental practitioners and excluding other health disciplines such as medicine (Godwin, Hoang et al. 2014). Moreover, the literature mostly focused on the views and experiences of rural dental practitioners. As one of the strategies is to encourage non-rural dental practitioners to move to and stay in rural areas, their views should also be explored. The aim of this study was to describe the opinions of Australian dental practitioners towards living and working in rural areas as a part of a further exploratory design research project.

In this study, the term dental practitioner follows the *Australian Dental Board's* general registration categories of dentists, dental prosthetists, and dental therapists, dental hygienists, and oral health therapists (Dental Board of Australia 2015). Therapist, hygienist and oral health therapist participants were combined into one OHT group due to their similarities in provided services. The term urban refers to the Australian Standard Geographical Classification (ASGC) categories (Australian Government Department of Health and Ageing 2012), major city and inner regional, and the term rural refers to outer regional, remote, and very remote. This study included dental practitioners operating in the private sector, and those working for government clinics in the public sector.

4.3 Methods

This is a descriptive study (Sandelowski 2000) utilising semi-structured interviews. Ethics approval was obtained from the Tasmania Social Sciences Human Research Ethics Committee (H0013194). Purposive sampling was used to ensure that the sample was representative of the mentioned categories of Australian of dental practitioners, across urban and rural areas, male and female, different age groups and across different states.

Invitation letters and information about the study were sent to the presidents of the four dental associations (Australian Dental Association, Dental Hygienist Association of Australia, Australian Dental and Oral Health Therapist Association, and Australian Dental Prosthetists' Association) to ask for their support for the study. These four associations agreed to participate in the study. With their approval and support, advertisements to recruit participants were placed

in the organisations' websites and newsletters. Participants were asked to contact the researchers via email or phone if they were interested in participating in the study, they were then asked to use a snowball sampling technique to recruit others (Biernacki and Waldorf 1981). Phone interviews were used because dental practitioners are busy clinicians and were in various locations across the nation. Written consent forms were emailed to each participant. The forms were emailed, faxed or posted back to the researcher prior to the interview.

The interview guide was developed using findings from our systematic review (Godwin, Hoang et al. 2014) and discussion among the research team to investigate knowledge gaps in the existing literature. It was then piloted with five dental practitioners to make sure that the questions in the guide were appropriate and easy to understand. The interviews were divided into three parts: (i) participant background and training information, (ii) participant views/experiences of why they would or would not practice in rural areas, (iii) participant views on strategies to recruit and retain rural dental practitioners.

The interviews were developed to act as a hypotheses generating tool describing the opinions of dental professionals towards rural practice. All interviews were audio recorded and transcribed verbatim. Each of the interviews were listened back to alongside reading of their full transcriptions for quality assurance purposes. All data were anonymised prior to analysis. Participants are identified only by their professional category, gender, and age. The data were then imported into QSR-NVivo V.10.0 software (QSR International Pty Ltd. 2015) which assists researchers to store, code, classify and sort qualitative data. Two authors (DG and HH) analysed the data using content and thematic analysis (Joffe and Yardley 2004). DG and HH conducted the analysis independently, which involved coding the transcripts, categorising the codes and the generation of themes.

The research team met regularly during data collection and analysis to discuss the process of coding and theme assignment and any disagreements were solved by discussion. The study reached thematic saturation when the researchers identified the content of new interviews repeated that of previous interviews. The researchers used this, as it is a common method of determining if sufficient data has been collected in qualitative research (Morse 1995).

4.4 Results

Data were collected from November 2013 to March 2014. The interviews varied between 30 and 60 minutes. Participant demographic characteristics are presented in Table 4-1. Fifty registered dental practitioners were recruited: 34 dentists, eight dental prosthetists, and eight registered as therapists, hygienists and/or oral health therapists (OHT). Over half were male (56%) and over three-quarters (78%) lived in urban areas. Thirty-eight participants (76%) reported having some experience working in rural locations, while there were twelve participants (24%) who had never worked in rural areas.

Four themes emerged from the interviews: business case, clinical practice, community and individual. Summaries of the themes are provided in Figure 4-1.

4.4.1 Business case

When talking about working as a rural practitioner, the majority of the participants expressed their concerns about the long-term sustainability of rural practices, an oversupply of dental practitioners and their views on financial incentives to encourage dental practitioners to work in rural areas.

4.4.1.1 Sustainability of a rural practice

Financial viability: 37 out of 50 participants were concerned about the long-term income security of a rural practice. Due to the high cost of setting up and the daily running costs associated with a private dental practice, participants were concerned about the long-term sustainability and income levels of rural practices. Smaller population size in rural areas was seen as a barrier to rural practice if the local area and the number of patients within it were not large enough to support a dental practice.

> *There are more issues than just the money to build a clinic. Um… such as how big is the patient base actually going to be and how sustainable is a dental practice going to be in a particular area. (Dentist, female, 40 yo, urban practitioner-has previous rural experience)*

Household income of rural residents was also seen as an issue for financial viability.

> *That's an issue for rural areas in particular, in that they either don't have the income to pay for a full time dentist in the area and because it costs so much to set up a dental practice, you need to make sure it's going to be viable in that area. And that there might not be the population size to afford a rural practice. (Dentist, male, 31 yo, urban practice-has previous rural experience)*

The traditional small business model of the average private practice dentist was also a barrier to rural practice.

> *You go up there, and if you were to broke, nobody cares. You've gone broke. You've lost money, well that's hard luck for you. (Dentist, male, 66yo, rural practitioner)*

Financial viability of practicing in a rural area also concerned dental specialists and prosthetists:

> *I think population, the number, just having the amount of work required to maintain a practice. (Prosthetist, male, 49 yo, urban practitioner-has previous rural experience)*

Utilisation patterns: Dental practitioners were also concerned about the utilisation patterns of rural communities. Rural populations were considered to be less likely to seek preventative and routine dental treatment like check-ups, and more likely to seek treatment for problems than urban populations. This pattern of utilisation was considered a barrier to rural practice as it would result in an unviable business opportunity.

> *The other thing is that whilst we can talk about shortages and numbers of people, there's still a lot of people who are not choosing to access care so, not all of these small communities can actually realistically sustain a full time practitioner there. (Dentist, female, 52 yo, urban practitioner-no previous rural experience)*

> *...And in agricultural areas like this, people compare the price of a crown to the price of an acre of land, and they say well I can make more money out of an acre of land than I can by putting a crown on a tooth [laughs] so they opt for the cheaper options. (Dentist, male, 59 yo, rural practitioner)*

Business opportunities: Although some dentists were concerned about the financial viability of rural practice, others saw it as a business opportunity. Some participants decided to work in

rural areas because of a perceived need for their services, while others perceived rural practice as lacking the business opportunities available in urban areas.

> *I recognised a need in those areas so, um yeah, I'm filling that need, and also a commercial thing. Um, while sometimes it's not the best commercial decision it does return fairly well, but, fine. (Prosthetist, male, 56 yo, rural practitioner)*

> *I wonder whether, you know, it's financially viable, and for dentists it's more viable to stay in a central area and have people to come to you. To locate outside a central area, it's a little bit like a reverse economy. You don't get as much exposure and you don't, yeah, you don't get the same financial return. (Dentist, male, 44 yo, rural practitioner)*

Employment scarcity and security: Participants felt that there were too many new dental practitioners graduating from Australian universities. This increase in workforce numbers was thought to be causing employment concerns for dental practitioners in urban and some rural areas, especially for newer graduates.

> *... you know that there's going to be an oversupply of graduates, which I think you're going to find its going to be a lot easier to get people to go and do country service, just because, they're going to have to because there's going to be too many unemployed ones in the city. (Dentist, male, 62 yo, urban practitioner-has previous rural experience)*

Many participants (35/50) expressed their concerns with the current job market. There were concerns about limited job opportunities in urban areas and a national oversupply for dentists and oral health therapists. Many felt that as a result of their increasing numbers, the rural recruitment of dental practitioners was no longer a concern.

> *I think it is becoming less of an issue with the oversupply of dentists in the metropolitan areas, that people finding, feeling the pressure that they don't have the options of work in the city. Um, so they're being forced out into country areas anyway. (Dentist, female, 32 yo, urban practitioner-has previous rural experience)*

Some long-term rural dentists mentioned that they used to struggle to find suitable staff for their rural practice, they were currently inundated with eager applications for employment.

…I, for 30 years used to struggle, I would advertise and I would get absolutely no interest. …[now] I was inundated with applications, you'd only just got to throw, the smallest amount of bait out and there are just kids everywhere just wanting a job. (Dentist, male, 59 yo, rural practitioner)

Financial incentives: Despite believing financial incentives were important in regards to lifestyle maintenance and support, almost half of the participants (23/50) perceived they were not a key driving factor influencing work location decisions.

Oh, yeah it would certainly, certainly play into it, it would contribute to a positive decision to work in a rural area, but I think there are other intangibles which are, in my particular… which are more important than the financial incentives. (Dentist, male, 35 yo)

… they are important, that's why we go to work that's why we do what we do, that's part of the reason why we do what we do. …but that's also, it's a trade-off between lifestyle and the financial benefits. I would rather have less of a financial benefit but enjoy the lifestyle that I have. (Prosthetist, female, 49 yo, rural practitioner)

Some dental practitioners did not see financial incentives as important to encourage dental practitioners to work and stay in rural areas as there could be differences between urban and rural areas.

I don't think money brings people to um, you know to areas. It certainly, it doesn't retain them. I've employed you know various people over the years and paid them exceptionally well, but you know, you see them heading back to the city every second weekend to meet up with their mates and so on, and you know that they're not going to stay. So, you've really got to get somebody whose heart is in, in being where they want to be. (Dentist, male, 64 yo, rural practitioner)

I think it's important that you know rural areas that we least have the same earning capacity as metropolitan… I've worked in practices that I've had to go down almost $20 an hour and then in some cases I've moved states where I've had to go down nearly $30 an hour. OHT, female, 49 yo, urban practitioner-has previous rural experience)

4.4.2 Differences in clinical practices

When discussing rural recruitment and retention, 43 participants felt that there were differences in clinical practices between urban and rural practice which in turn influenced their decision to move to and stay in a rural area. This included clinical procedures, job satisfaction and professional progression.

4.4.2.1 Clinical development

Dental practitioners did not consider the industry to have important prospects for career progression, advancement and promotion other than that achieved through private practice ownership. Rural practice was considered to be a further limiting factor to career progression and advancement.

> *That unfortunately dentistry via its nature is a, is a terminal profession. In that there's um not a lot of um opportunities for upward advancement, and that upward advancement is even less so in a rural area. (Dentist, male, 34 yo, rural practitioner, has previous rural experience)*

Rural practitioners who were private owners were often limited in their ability to provide learning opportunities to new clinicians. This was especially problematic when they owned a practice with only one chair, lacking the resources to provide teaching, or the facilities to allow for another practitioner in the practice. Participants felt that new graduate practitioners required professional support and mentoring from senior clinicians in order to increase and grow their skills and confidence levels. This was of particular importance in rural areas, where there is less access to referral pathways and specialist assistance.

> *… the graduates don't tend to have had as much clinical experience as perhaps they once did. And their anxiety to me was "what if I start to do something and don't know how I finish it?" because you know there's no one there who can help me." (Specialist dentist, female, 52 yo, urban practitioner-has previous rural experience)*

Providing new clinicians with positive rural exposure and a rewarding working environment was seen to increase their likelihood of long term retention. Dental practitioners who had themselves been in receipt of quality mentoring rated its reciprocation to current new graduates

as particularly important. Mentors were able to quickly and effectively increase new graduate's clinical confidence through rewarding and supportive teaching opportunities.

> *I guess the experience that I knew I was going to get when I moved out there [a rural area], my mentor, was really nice and really encouraging. (New graduate dentist, female, 25 yo, rural practitioner)*

Rural practice was considered a barrier to accessing professional support networks. Rural practitioners used the internet to overcome this isolation. Rural practitioners spoke about the increasing professional and personal support which could be available to rural areas through professional associations, using methods such as phone help services, online help, and electronic network communities of rural practitioners.

4.4.2.2 Job satisfaction

Professional rewards: Participants (19) mentioned an increased sense of professional satisfaction and pride from their clinical work in rural areas as professional reward. Rural practitioners felt more valued for their services to the local community, that they had status in the local community and enjoyed people 'knowing who they are'.

> *I went out to some really tiny Aboriginal communities for a week at a time, and I just had a ball, I really loved it and you can really tell, like you ask somebody in a small community if you're making a difference and I guess, that played a big part in me choosing to go rural. (New graduate dentist, female, 25 yo, rural practitioner)*

Clinical pride: Twelve participants mentioned that being dental practitioners in a rural area brought clinical pride, reinforced by their sense of thanks and adoration received from patients. Rural practitioners felt pride in what they provided to their local communities, which was often enhanced if they were the only dental services available in the area.

> *I found it much more fun to practise in those areas, much more rewarding you'd have people with serious um dental conditions which were affecting their medical health rather than just a simple broken tooth. (Dentist, female, 32 yo, urban practitioner-has previous rural experience)*

Clinical procedures: Rural practice was considered an avenue for requiring increased clinical skills, as there were less available referral pathways to other health practitioners. Rural practice for younger practitioners was considered a fast way to up skill and learn clinical treatments quickly.

Geographical isolation: Close to half (21) practitioners were concerned about geographical isolation from urban centres. This was seen as a barrier for access to professional services due to increased travel time and costs, and increased amount of time taken away from work to attend sessions in urban centres.

> *I would definitely make sure that there was an education, peer support network for rural practitioners, um, I'd make sure there was some sort of assistance for their greater out of pocket costs. (Dentist, female, 54 yo, urban practitioner-no previous rural experience)*

Support from professional associations, professional networking and peer group support was thought to be harder to access in rural areas than urban areas due to a lower number of health professionals.

4.4.3 Community

Fitting into the local community played an important role in dental practitioners' decisions to move and stay in a rural area. The participants spoke about who they were, what they valued, and how they provided for and were provided for in their social networks and communities.

Social support networks: Social support networks were rated high on the list of important factors which influence participants' decisions to move to rural areas. Regardless of their upbringings, either urban or rural, participants felt connected and comforted by the presence of family and friends. It was the strength of their connectedness to outside of work social contacts which enabled them to enjoy and value their lifestyles. Family ties were mentioned by 13 participants as shaping where they chose to work.

> *Lifestyle, I think, and family. I think just know where you like to live, I'd prefer to live in a rural area. (Prosthetist, male, 52 yo)*

Social isolation: All interview participants mentioned the high importance of belonging and fitting in their local community. There were increased problems associated with moving away

from support areas. Participants stated that moving away from where they currently live and where they have pre-established social support networks had simply not occurred to them. Others had not ruled out a move, but did not have enough incentive to relocate and were fearful, and concerned about loneliness and community integration. Some rural practitioners who were working away from family and friends described it as a lifestyle choice, one which was overcome by regular travel to urban areas.

> *The lifestyle I think I was sort of itching to get back into the CBD [city area]. Um mainly because of you know being closer to friends and family. (Dentist, male, 59 yo, urban practitioner-has previous rural experience)*

Community was mentioned as a negative aspect of rural practice in relation to ethnicity and individuals who were not 'local', and as a result felt that they were not accepted by the rural community. However, community engagement was a positive factor for rural practice for dental practitioners, providing social support, networking and social activities.

Some participants believed that rural areas had a stronger sense of community engagement than urban areas. Practitioners felt that having an established practice and being a visible outside of work personality in the local community was key to retaining dental practitioners in rural areas. Some urban dental practitioners who moved to rural areas found an initial sense of isolation and loneliness, but with social and community integration, they assimilated into the community and gained a sense of belonging. This 'urban' identified participant explains their journey into the local community.

> *I live in a small town now and I don't think I've ever lived somewhere so social in my whole life. It's a lot more social because you end up making your own fun. (OHT, female, 58 yo, rural practitioner)*

4.4.4 Individual factors

Participants were asked about their personal backgrounds. Individual factors such as backgrounds, family needs and quality of life played an important role in dental practitioners' decisions about working in rural areas.

4.4.4.1 Rural background

Participants who had a rural background were likely to mention the simple enjoyment of living and working in smaller communities. Participants who self-identified as 'rural' were likely to have grown up in a rural area or had spent a major proportion of their working lives in rural areas.

> *I've got this bigoted view that rural people want to work in rural areas, and people who grew up in the metropolitan areas probably want to work in metropolitan areas. And the reason I think that is, you couldn't pay me enough to get me to work in the metropolitan area and yet, yet we sort of, you get people going around saying, "so why won't they move to the country?" and I say oh well the same reason I won't move to the city." (Dentist, male, 63 yo, rural practitioner)*

Participants who self-identified as 'urban' felt fearful about rural practice as a result of not having had previous experiences or exposure to rural areas. Urban background practitioners mentioned never having considered rural practice due to already having employment opportunities in their local area.

4.4.4.2 Rural exposure

22 participants mentioned rural exposure prior to working as a dental practitioner in a rural area. This was most likely to occur during their education through rural clinical placement programs, during previous rural work experiences through contractual work, or their own rural background and their partners'. This allowed practitioners to develop a true sense of the rural lifestyle and the realities of rural practice and community integration. Rural exposure was felt to increase the likelihood of initial rural recruitment and longer term rural retention.

> *I think what they're doing at the moment that's having universities in rural settings. It's sort of giving the students the opportunity to actually be exposed during that 5 years training. And also that may give them the opportunity to sort of go, look maybe this isn't that bad after all, it's actually quite a nice experience personally. (Dentist, female, 33 yo, urban practitioner-has prior rural experience)*

4.4.4.3 Family needs

The actual location of their practice was more often influenced by wider family concerns. The provision of lifestyle rewards for partners and children were the most important factors. Rural practice was considered a barrier to accessing appropriate high school and tertiary education.

> *…our son's education, he was getting to 12 years of age and it was a choice either he went to boarding school or we would relocated. And we looked at the alternatives and boarding school was not one that we welcomed so we relocated. (Dentist, male, 70 yo, current urban practitioner-has extensive previous rural experience)*

Dental practitioners also identified their significant others as having influence over where they chose to work and for how long. Rural areas were considered more difficult for employment opportunities for couples as two professionals. However, having a partner or a spouse with a rural background or upbringing could increase the likelihood of rural practice.

> *… The big thing that I would emphasis would be the lack of job opportunities for partners, because partners are likely to be educated and you know professionals and so, it's certainly a major factor for a lot of people. (Dentist, female, 32 yo, urban practitioner, has previous rural experience)*

4.4.4.4 Quality of life

40 participants mentioned quality of life when discussing rural recruitment and retention. Participants referred to lifestyle rewards and rural enjoyment as quality of life.

> *…it's mainly just lifestyle rather than work, where I, that determines where I live. (Prosthetist, male, 52 yo, urban practitioner-has previous rural experience)*

Rural practitioners enjoyed what they called 'rural lifestyle' this was considered separate from 'city lifestyle'. This term referred to feelings of a more relaxing and laid back daily life. Lifestyle rewards were considered in conjunction to all types of financial incentives, and were thought to be more important provided the financial incentives allowed a reasonable income. Lifestyle rewards were considered to be of key importance for rural practitioners to facilitate long-term retention.

4.5 Discussion

These findings confirms some factors from previous studies, and it adds that private practitioners were concerned about the future income security when considering to move to a rural practice. This was not a concern for practitioners in the public sector as they were salaried employees. While other factors such as enjoyment of rural lifestyle (Kruger and Tennant 2005, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Hall, Garnett et al. 2007), social isolation (Kruger and Tennant 2004, Kruger and Tennant 2005, Richards, Farmer et al. 2005, Silva, Phung et al. 2006, Bazen, Kruger et al. 2007, Daniels, VanLeit et al. 2007, Campbell, McAllister et al. 2012), limited access to facilities and social activities (Kruger and Tennant 2005, Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007), limited access to education services for children (Kruger and Tennant 2005, Richards, Farmer et al. 2005), and limited job opportunities for partners (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007, Renner, Westfall et al. 2010); could be negotiated, ignored or 'solutions' found, the failure to reach an appropriate income level to support one's family was not able to be substituted with other factors. Participants expressed concern that some rural areas did not have large enough population numbers to adequately financially support a full-time private practitioner. Australia is one of the most sparsely populated countries in the world. Nearly 90% live in urban areas (more than 1,000 people) (Australian Bureau of Statistics 2013). However; in 2011, 1.8 million people lived in rural areas outside any defined towns or localities (Australian Bureau of Statistics 2013). Tennant and colleagues (Tennant, Kruger et al. 2013) proposed that there was a minimum population level for communities which is required in order to support a full-time dental practitioner and that many areas in Australia do not fulfil this population requirement. This is further complicated by differences between urban and rural clinical work, including lower routine visiting patterns (Skillman, Doescher et al. 2010) and a higher likelihood of emergency treatments (Australian Institute of Health and Welfare 2009). In Australia, dental services are largely provided in the private sector (85%) (Kruger and Tennant 2015), and the burden of payment falls to the individual . The cost of treatment is a common reason for people to avoid dental treatment, leaving a large proportion of the community with untreated dental issues (Kruger and Tennant 2005, Harford, Ellershaw et al. 2011). Given the manner in which dental care is provided, a private dental practitioner requires

a larger patient base than a medical practitioner does to financially support their practice and many widely-dispersed rural areas in Australia do not have the population size to support a full-time dental practitioner (Barnett, Hoang et al. 2015).

Strategies such as higher salaries and financial remuneration (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007) to encourage rural practice would attract public dental practitioners. A recent program in Australia provides relocation incentives and infrastructure support grants to private dentists who relocate to provide general dental services in regional and remote locations (Rural Health Workforce Australia 2015). However, for many participants in the current study, there had to be assurance of long-term financial security from the work location before other factors were considered. This is a complex issue which requires flexible, practical and different models tailored for rural oral health care delivery for individual communities (Skillman, Doescher et al. 2010), mobile clinics and tele-dental services (Chen, Hobdell et al. 2003).

Another important finding from this study was that individual factors played an important role in influencing rural retention (Veitch and Grant 2004, Hall, Garnett et al. 2007). These aspects included the successful formation or pre-existence of strong social bonds to the local community and personal enjoyment of rural lifestyle (Hall, Garnett et al. 2007). This was facilitated by the local rural area being able to 'provide' certain lifestyle necessities for the individual and their families. The most important of these 'provisions' were family concerns: quality schooling opportunities for children (Kruger and Tennant 2005), and sufficient employment opportunities for partners (Kruger and Tennant 2005). Furthermore, having prior rural exposure and positive experiences of rural areas for themselves and their partners influenced later work location decisions (Wilkinson, Beilby et al. 2000, Laven and Wilkinson 2003, McFarland, Reinhardt et al. 2012). This is known as the Rural Background Effect (Azer, Simmons et al. 2001, Jones, Humphreys et al. 2012). The strategies which supported this factor were: increasing the number of dental students at universities with rural upbringings (Laven and Wilkinson 2003, Silva, Phung et al. 2006, Grobler, Marais et al. 2009), rural placement programs during undergraduate training (Richards, Farmer et al. 2005, Bazen, Kruger et al. 2007, Grobler, Marais et al. 2009), locating dental schools in rural areas (Laven and Wilkinson 2003, Grobler, Marais et al. 2009, McFarland, Reinhardt et al. 2010). Retention issues are

extremely complex and so too would be the solution, with issues to be addressed in the future being avenues to facilitate employment opportunities for the spouses of relocating dental practitioners, sense of belonging in rural communities and social engagement with local populations.

The limitations of this study were due to the nature of volunteer participants, there was a higher than average proportion of rurally experienced dental practitioners donating their time for the interviews. Using snowball sampling could introduce bias as individuals who know each other could share similar characteristics and opinions. The higher number of dentists compared with OHT's and prosthetists could mean that factors which were influential for dentists in comparison to other dental practitioners may have been overly addressed. Further rural dental practitioner workforce research with a larger sample size is required to assist policy makers plan for more equitable access to oral health care for rural Australians.

4.6 Conclusions

The main factor influencing rural recruitment and retention was financial sustainability. Dental practitioners felt that it was harder to earn a sustainable income and provide quality lifestyles for their family in some rural areas. Previous experience of rural areas was considered to be highly influential towards long-term rural retention.

1.1.1 Competing interests

The authors declare that they have no competing interests.

1.1.2 Author's contributions

DG carried out the interviews, transcribed and analysed the data, and drafted the manuscript. HH analysed the data and helped to draft the manuscript. LC participated in the analysis of the data and edited the manuscript. All authors read and approved the final manuscript.

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1.2 Postscript

In this chapter, I have investigated the attitudes of Australian dental practitioners towards living and working in rural areas. The key positive attitude towards living and working in rural areas was prior rural exposure during upbringing. The key negative attitude towards working in rural areas was a perceived lack of reasonable income from rural practice compared with higher perceived income attainable from urban practice. This work built upon the knowledge of the attitudes of Australian dental practitioners towards rural practice and provided important insight into the opinions of dental practitioners' rural work experiences through phone interviews. In the next chapter (**Chapter 5**), the findings from the interviews were used to test the key factors that influence rural recruitment, retention, and turnover of Australian dental practitioners.

4.7 Tables and Figures

Table 4-1: BMC Oral Health Table 1. Characteristics of participants

	Dentist (N=34)	Prosthetist (N=8)	OHT (N=8)	Total (N=50)	Percentage %
Location of Practice					
RA1-Major cities				(18/50)	48%
RA1 male	9	3	0	12	
RA1 female	6	0	0	6	
RA2-Inner regional				(21/50)	42%
RA2 male	10	1	1	12	
RA2 female	5	1	3	9	
RA3-Outer regional				(3/50)	6%
RA3 male	0	1	0	1	
RA3 female	1	1	0	2	
RA4-Remote				(1/50)	2%
RA4 male	0	1	0	1	
RA4 female	0	0	0	0	
RA5-Very remote				(4/50)	8%
RA5 male	2	0	0	2	
RA5 female	0	0	2	2	
Unemployed				(3/50)	6%
Unemployed male	0	0	0	0	
Unemployed female	1	0	2	3	
Classification of practice					
Urban	30	5	4	(39/50)	78%
Rural	3	3	2	(8/50)	16%
Unemployed	1	0	2	(3/50)	6%
Prior rural exposure					
Yes	25	6	6	(37/50)	74%
No	9	2	2	(13/50)	26%
Age groups					
20-34	10	0	2	(12/50)	24%
35-44	6	0	2	(8/50)	16%
45-54	4	4	2	(10/50)	20%
55-64	10	4	2	(16/50)	32%
65+	4	0	0	(4/50)	8%
Birthplace					
Africa	1	0	0	(1/50)	2%
Asia	5	0	1	(6/50)	12%
Australia	21	6	5	(32/50)	64%
Europe	6	0	2	(8/50)	16%
North America	1	0	0	(1/50)	2%
New Zealand	0	2	0	(2/50)	4%

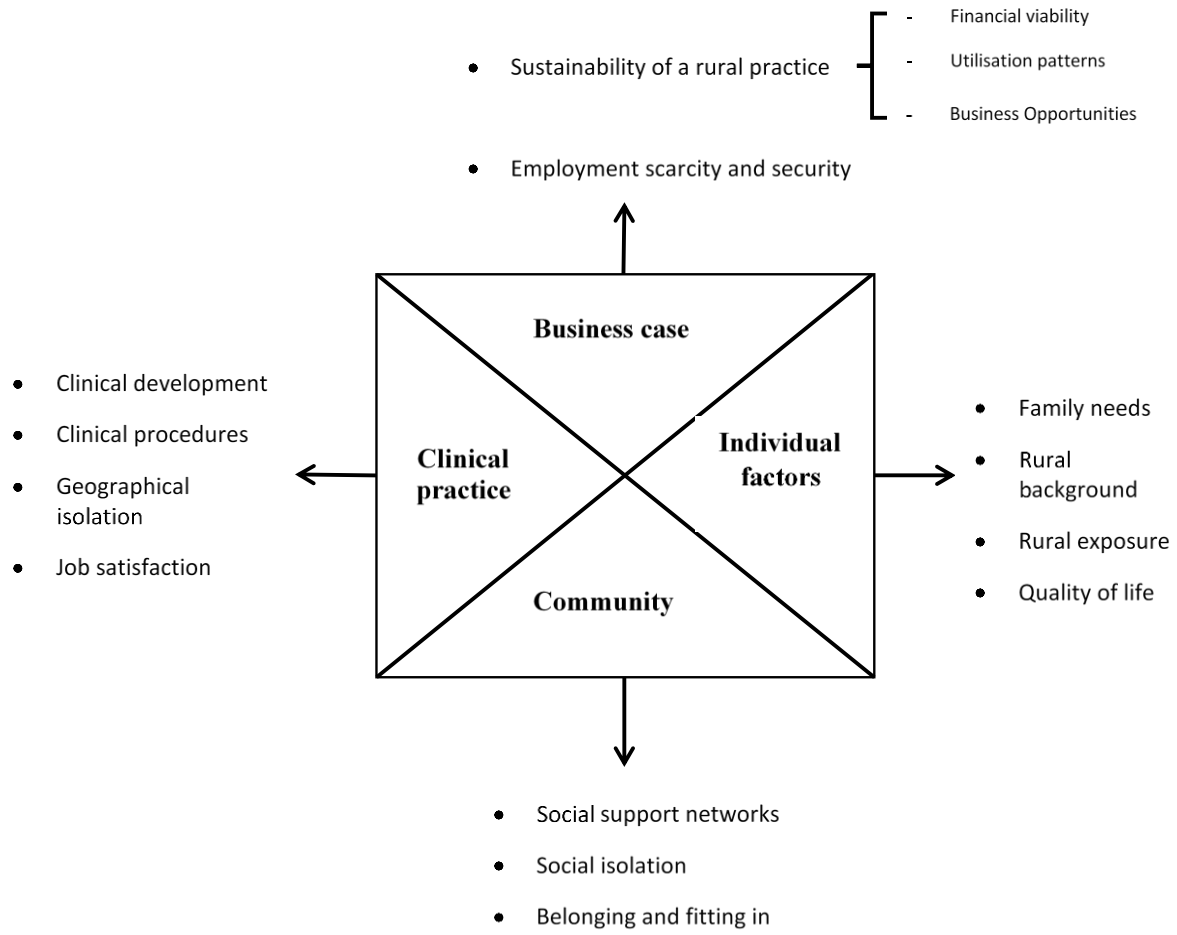

Figure 4-1: BMC Oral Health Figure 1. Thematic schema representing dental practitioners' perspectives on rural recruitment and retention.

5 FACTORS INFLUENCING AUSTRALIAN DENTAL PRACTITIONERS' DECISIONS ON RURAL PRACTICE RECRUITMENT, RETENTION AND TURNOVER

5.1 Preface

In the previous chapter, I presented the qualitative findings from the first section of the study. This chapter addresses the second research question, and will investigate and discuss the factors that influence Australian dental practitioners' decisions on rural practice recruitment, retention and turnover. The research contained within this chapter has been submitted for publication in the *Australian Journal of Rural Health.*

5.2 Introduction

Good oral health is essential to overall general health (Petersen 2003). In Australia, there has historically been a regional mal-distribution of dental practitioners (Tennant, Kruger et al. 2013) with the majority working in metropolitan areas in private practice (Australian Institute of Health and Welfare 2014). This mal-distribution can impede timely and affordable access to dental treatment services for rural populations.

Rural population oral health is poorer than urban population oral health (Roberts-Thomson and Do 2007) due to poorer access to dental services (Curtis, Evans et al. 2007) and fluoridated water (Crocombe, Stewart et al. 2012), lower socio-demographic status (Crocombe, Stewart et al. 2012), being older (Crocombe, Stewart et al. 2012), and having a different attitude to health (Crocombe, Stewart et al. 2012). Rural people seek dental treatment services less frequently, and often seek emergency treatments rather than preventative services (Crocombe, Stewart et al. 2010, Crocombe, Stewart et al. 2012).

Three quarters (75%) of the dental practitioner workforce are registered as dentists and specialists; ADPs (Allied Dental Practitioners: dental hygienists, dental therapists, oral health

therapists and dental prosthetists) make up the other quarter (Australian Bureau of Statistics 2013). Some dental practitioners are unwilling to work in rural areas due to perceived difficulties in earning a sustainable income compared with more populated urban areas (Godwin, Hoang et al. 2016). Dental practitioners are often attracted to rural practice with lifestyle factors and the opportunity to establish their own practice (Kruger and Tennant 2005).

There has been an increase in dental graduate numbers in recent years, particularly of women (Brake, Bloemendal et al. 2003, Dental Board of Australia 2015), and there are differences in working patterns between male and female dentists (Ayers, Thomson et al. 2008). Women were more likely than men to take a career break to raise children (Ayers, Thomson et al. 2008). Women on average worked shorter hours per week, saw fewer patients, were less likely to own a practice, and had lower incomes than men (Ayers, Thomson et al. 2008). This suggests that attitudes to dental practice may be changing. As dental practitioner numbers increase, the issue of rural dental workforce recruitment may be solving itself. There is however, potential for increased workforce turnover, as dental practitioners move away from rural into urban areas for a range of social and professional reasons. While some dental practitioners choose to work in rural areas, we need to better understand the reasons why they do and the barriers they face, in order to develop strategies to persuade more of them to do so. It is important for future workforce planning to identify the differences in rural work practice attitudes between men and women as gender distribution and societal trends change.

This paper tests key factors identified in previous literature as indicative of recruitment, retention, and turnover decisions for dental practitioners (Godwin, Hoang et al. 2014). The aim of this study was to determine which factors were associated with rural practice recruitment, retention and turnover for Australian dental practitioners.

5.3 Methods

The data collection instrument used in this study has previously been described in the *Australian Dental Journal* (Godwin, Blizzard et al. 2016). Data were collected using a self-administered online cross-sectional survey of Australian registered dental practitioners: dentists, specialists,

and ADPs promoted by an advertising campaign through the Australian dental professional associations, participants gave informed consent prior to completing the survey.

5.4 Statistical analysis

Ordinal log multinomial regression (Blizzard, Quinn et al. 2013) using a forwards-descending adjacent categories model was used to estimate association of rural practice with the five ordered levels of respondent ratings of the importance potentially influencing recruitment, retention, and turnover in dental practice in Australian rural areas. The responses were ordered on a rating scale utilising five levels of importance: 'very important', 'important', 'neutral', 'unimportant', and 'not at all important'. The covariate was a binary term for rural practice computed from the postcode of the respondent's primary practice location to determine the ASGC-RA category (Australian Government Department of Health and Ageing 2012) of the area where they work. This was then assigned either an 'urban' or a 'rural' classification by grouping ASGC-RA 1 (major cities) and 2 (inner regional) as 'urban', and ASGC-RA 3 (outer regional), 4 (remote) and 5 (very remote) as 'rural'.

Prevalence ratios with 95% confidence intervals were reported as the probability of being a rural-based practitioner relative to urban practitioners advancing to a level of lesser importance on each attitudinal scale. The attitudinal scales were categorised into four themes (work structures, workplace relations, financial issues, and lifestyle). The estimates are adjusted for age. Data analysis were undertaken using SPSS version 22, and STATA version 14. Ethics approval was obtained from the *Tasmanian Social Sciences Human Research Ethics Committee* (H0013194).

5.5 Results

Approximately 11,300 dental practitioners were invited to participate, and 631 questionnaires were completed (6%). Approximately half (47%) of respondents were men (Table 5-1). Dentists and specialists comprised 91% of the male participants, and 51% of the women. Female respondents were on average 10 years younger than the males, and over half (56%) had an Australian urban background. The majority (85%) were Australian citizens, almost all (92%)

had attended an Australian dental school in an urban area, and most (84%) worked in urban practice at the time of the survey. Rural workforce participation was associated with two attitudinal factors for men (Table 5-2), and 12 for women (Table 5-3).

Work structure factors that were more likely to be considered of lesser importance by female rural practitioners than by female urban practitioners were the desire to set up a new practice (PR=1.05, p=0.020), flexible work hours (PR=1.25, p=0.002) long work hours (PR=1.10, p=0.004), heavy workloads (PR=1.09, p=0.006), and too many on call duties (PR=1.05, p=0.027). Workplace relations factors more often regarded as of lesser importance by female rural practitioners than by their urban counterparts were inadequate supervision (PR=1.07, p=0.002), difficulties recruiting staff (PR=1.07, p=0.012), and issues with colleagues (PR=1.10, p=0.040). Lifestyle factors that were more likely to be rated of lesser importance by female rural practitioners than by their counterparts in urban areas were lack of community (PR=1.09, p=0.016), desire to be close to extended family (PR=1.05, p=0.031), and expectations failing to meet reality (PR=1.07, p=0.009). Financial issues factors more likely to be rated as being of lesser importance by rural practitioners were poor financial incentives (men: PR=0.99, p=0.011), cost of living (men: PR=1.04, p=0.020), and affordable housing (women: PR=1.12, p=0.003). There were not marked differences between the practitioner groups of dentists/specialists and ADPs in the analysis of factors associated with rural practice.

5.6 Discussion

Work structures, workplace relationships, lifestyle, and financial issues factors were associated with rural practice for women. Financial issues factors were associated with rural practice for men. These findings indicate that rural dental practitioners were less concerned with negatively described rural practice factors of increased workload (Kruger and Tennant 2005, Hall, Garnett et al. 2007), and dissatisfaction with rural lifestyle and inability to successfully integrate into the rural community (Kruger and Tennant 2005, Hall, Garnett et al. 2007), than their urban colleagues.

Rural male participants were more likely to consider cost of living to be of lesser importance than male urban practitioners, but rural male participants were more likely to consider poor

financial incentives other than income to be of greater importance than male urban practitioners. Previous work has identified difficulties with sustainable income from rural practice to be a key barrier to rural practice for dental practitioners working in private practice (Godwin, Hoang et al. 2016). Understanding the work and social factors which affect rural practice choice for dental practitioners is a key part in developing effective long-term incentive programs and strategies to increase access to dental health services for rural populations.

The influence of financial incentives on rural recruitment and retention is mixed (Kruger and Tennant 2005, Godwin, Hoang et al. 2016), but rural practice is often less financially lucrative than urban practice (Godwin, Hoang et al. 2016). The less regular patterns of dental attendance in rural areas can negatively affect income security for private dental practitioners (Godwin, Hoang et al. 2016). We found that income was not was associated with rural practice, but poor financial incentives were associated with leaving an area for rural practitioners.

Women in rural practice were less concerned with work structure arrangements than women in urban practice. A career as a dental practitioner offers flexibility and business (Scarbecz and Ross 2002). These factors distinguishes dentistry from many other health professions. There has been an increasing proportion of women working as dental practitioners in Australia (Australian Institute of Health and Welfare 2014, Dental Board of Australia 2015). Women are more likely than men to work part time (Walton, Byck et al. 2004, Ayers, Thomson et al. 2008), and to take career breaks to raise children (Ayers, Thomson et al. 2008, Pallavi and Rajkumar 2011). Female dental practitioners traditionally work fewer hours per week (Kaldenberg, Becker et al. 1995, Walton, Byck et al. 2004, Ayers, Thomson et al. 2008), see fewer patients (Kaldenberg, Becker et al. 1995, Brake, Bloemendal et al. 2003, Pallavi and Rajkumar 2011), have lower incomes (Kaldenberg, Becker et al. 1995) are less likely to own a practice than men (Ayers, Thomson et al. 2008, Pallavi and Rajkumar 2011) and male and female dentists do not differ significantly in their working hours until they have children (Pallavi and Rajkumar 2011).

Access to flexible work hours was associated with rural practice for women, they considered flexibility to be less important than women who worked in urban areas. This finding indicated that access to flexible work arrangements was a key factor for female dental practitioners when deciding whether to remain working in a rural area, and for women for whom it was of lesser

importance, were more likely to remain working in rural areas. Although working in a dental practice can be both physically and mentally demanding (Pallavi and Rajkumar 2011), the perceived increased hours often evident in the working structure of rural dental practitioners compared with urban practitioners were not a concern for female rural practitioners.

The sample size was small relative to the number of dental practitioners in Australia as there has been a historic decline in response to surveys of health professionals (Funkhouser, Vellala et al. 2016), but sufficient to provide adequate power for the intended analyses, and our survey participants were representative of the national dental workforce (Australian Institute of Health and Welfare 2014, Funkhouser, Vellala et al. 2016). The sampling frame was limited to members of professional dental associations, but it covers over 60% of the study population. Finally, the cross-sectional study design does not support attrition of causation in the associations identified. This study adds to the small amount of research into the influences on rural practice for Australian dental practitioners.

Further research could entail a larger sample size of all registered dental practitioners, and a longitudinal study following the practice location movements of dental practitioners from graduation onwards. This study adds new knowledge to the previously untested predictors of rural practice for Australian dental practitioners.

5.7 Conclusions

Work structures, workplace relationships, lifestyle, and financial issues factors were associated with rural practice for women. Financial issues factors were associated with rural practice for men. These findings indicate that rural dental practitioners were less concerned with negatively described rural practice factors than their urban counterparts.

5.8 Conflict of interest statement

The authors acknowledge that there is no conflict of interest to disclose.

5.9 Postscript

This chapter has identified the factors that influence the rural recruitment and retention of Australian dental practitioners. The next chapter will investigate whether dental practitioners

with a rural background were more likely to work in rural areas than dental practitioners who do not.

5.10 Tables

Table 5-1: Characteristics of participants

	Male	Female
Characteristic	**% (n/N)**	**% (n/N)**
Sex	47.1% (297/631)	52.9% (334/631)
Background		
Urban Australia *	49.5% (147/255)	46.7% (156/286)
Rural Australia †	4.4% (13/255)	6.0% (20/286)
Overseas	32.0 % (95/255)	32.9% (110/286)
Residential status		
Australian citizen	93.3% (277/297)	91.9% (307/334)
Resident ‡	6.7% (20/297)	8.1% (27/334)
Family status		
Partner and children	66.0% (196/297)	50.2% (166/331)
Partner, no children	13.5% (40/297)	23.9% (79/331)
Single and other	20.5% (61/297)	25.9% (86/331)
Professional group		
Dentist	75.1% (223/297)	48.2% (161/334)
Oral health therapist	2.0% (6/297)	12.3% (41/334)
Therapist	0.7% (2/297)	15.9% (53/334)
Hygienist	0.7% (2/297)	13.4% (45/334)
Prosthetist	6.0% (18/297)	2.4% (8/334)
Specialist	15.5% (46/297)	3.0% (10/334)
Hygienist & Therapist	0.0% (0/297)	4.8% (16/334)
Age group		
< 35 years	14.5% (43/297)	30.8% (103/334)
35 – 44 years	8.1% (24/297)	22.2% (74/334)
45 – 54 years	24.6% (73/297)	28.1% (94/334)
55 – 64 years	35.0% (104/297)	16.2% (54/334)
65 – 74 years	16.1% (48/297)	2.4% (8/334)
> 75 years	1.7% (5/297)	0.3% (1/334)
	Age mean 53.45	Age mean 43.79
	Age standard deviation 12.82	Age standard deviation 11.60
Workplace type§		
Private	79.8% (237/297)	59.9% (200/334)
Government	7.4% (22/297)	14.4% (48/334)
Community health clinic	1.0% (3/297)	10.8% (36/334)
Hospital	3.0% (9/297)	3.9% (13/334)
University	5.7% (17/297)	6.3% (21/334)
Other	3.0% (9/297)	4.8% (16/334)
Time at workplace‖		
<5 years	28.3% (84/297)	46.6% (156/334)
5 – 10 years	12.1% (36/297)	23.1% (77/334)
10 -15 years	13.5% (40/297)	11.7% (39/334)
>15 years	46.1% (137/297)	18.6% (62/334)
Work hours¶		
<20 hours	10.1% (30/297)	16.8% (56/334)
>20 but <30 hours	23.9% (71/297)	41.6% (139/334)
>30 hours	66.0% (196/297)	41.6% (139/334)
Student debt**		
No	75.1% (223/297)	60.5% (202/334)
Yes	24.9% (74/297)	39.5% (132/334)
Dental school		
Australia	92.9%276/297	91.3%305/334
Overseas	7.1%21/297	8.7%29/334
Location of work		
Urban††	83.5% (248/295)	83.8% (280/334)
Rural‡‡	15.8% (47/295)	16.2% (54/334)
Rural clinical placement§§		

No	83.5% (248/297)	70.1% (234/334)
Yes	16.5% (49/297)	29.9% (100/334)

* ASGC-RA: 1 (major cities) or 2 (inner regional)
† ASGC-RA: 3 (outer regional) or 4 (remote) or 5 (very remote)
‡ Permanent or temporary resident
§ Primary workplace categorical type
|| Length of time at current workplace (years)
¶ Average number of hours worked a week
** Had a higher education loan or student debt
†† ASGC-RA 1 (major cities) or 2 (inner regional)
‡‡ ASGC-RA 3 (outer regional) or 4 (remote) or 5 (very remote)
§§ Participated in a rural clinical placement program during undergraduate training

Table 5-2: Factors associated with decreasing level of importance for decisions to practice in a rural area for men

Men	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)	PR (95% CI) †
Work structures						
Heavy work load	9%(10/111)	15.4%(35/227)	18.3%(35/191)	22.2%(18/81)	15.8%(3/19)	1.00(0.94, 1.07)
Set up new practice	8.1%(6/74)	15.3%(25/163)	17.5%(31/177)	14.5%(16/110)	21.9%(23/105)	1.06(0.99, 1.12)
Work experience	18.2%(26/143)	16.1%(42/261)	10.7%(16/149)	19.6%(9/46)	26.7%(8/30)	1.05(0.98, 1.11)
Widen skills	20.8%(31/149)	16.3%(47/288)	12.2%(17/139)	6.7%(2/30)	17.4%(4/23)	0.92(0.83, 1.03)
Poor working conditions	13.3%(33/249)	16.5%(43/260)	17.1%(13/76)	27.3%(6/22)	27.3%(6/22)	0.99(0.95, 1.03)
Too many on call duties	11.7%(9/77)	13.2%(25/189)	15.9%(36/227)	17.2%(15/87)	32.7%(16/49)	1.03(0.96, 1.10)
Flexible work hours	11%(22/200)	18.5%(61/330)	16.4%(12/73)	28.6%(4/14)	16.7%(2/12)	1.04(0.94, 1.15)
Long work hours	8.7%(11/126)	15.2%(35/230)	20.3%(35/172)	20%(16/80)	19%(4/21)	1.05(1.00, 1.11)
Workplace relations						
Employment for partner	14.1%(27/191)	18.7%(37/198)	12.3%(16/130)	17.1%(6/35)	20%(15/75)	0.98(0.91, 1.05)
Inadequate supervision	11.1%(8/72)	13%(24/184)	17.8%(30/169)	23.6% (29/123)	12.3%(10/81)	1.12(1.00, 1.25)
Difficulties recruiting staff	12.4%(11/89)	9.8%(25/254)	22.1%(40/181)	22%(13/59)	26.1%(12/46)	0.99(0.93, 1.05)
Issues with colleagues	12.1%(20/165)	16.4%(37/226)	17.5%(28/160)	18.2%(8/44)	23.5%(8/34)	1.04(0.98, 1.10)
Lifestyle						
Personal isolation	13.5%(26/193)	15.9%(37/232)	22.9%(27/118)	11.5%(6/52)	14.7%(5/34)	1.02(0.93, 1.12)
No employment for partner	13.7%(31/227)	18.7%39/209)	15.5%(17/110)	8.1%(3/37)	23.9%(11/46)	1.01(0.94, 1.10)
Partner career	16.2%(33/204)	16.8%(40/238)	15.9%(18/113)	10.3%(3/29)	15.6%(7/45)	1.00(0.95, 1.05)
Lack of community	13.2%(17/129)	16.5%(42/255)	13.4%(22/164)	22.2%(10/45)	27.8%(10/36)	0.97(0.89, 1.07)
Children's education	13%(33/253)	19.7%(37/188)	15.6%(12/77)	16.2%(6/37)	17.6%(13/74)	0.99(0.91, 1.07)
Return to placement	18.4%(7/38)	16.3%(15/92)	13.4%(33/247)	16.5%(17/103)	19.5%(29/149)	0.99(0.96, 1.02)
Return to hometown	15.6%(10/64)	17.4%(16/92)	11.1%(21/189)	14%(13/93)	21.5%(41/191)	1.00(0.97, 1.03)
Social networks	14.8%(9/61)	13.1%(23/176)	16.1%(33/205)	18.8%(12/64)	19.5%(24/123)	0.98(0.94, 1.02)
Extended family	10.6%(9/85)	15.3%(21/137)	16.4%(30/183)	16.5%(13/79)	19.3%(28/145)	1.02(0.98, 1.05)
Expectations‡	12.6%(18/143)	14.6%(38/261)	18.7%(28/150)	23.9%(11/46)	20.7%(6/29)	0.99(0.94, 1.04)
Multicultural area	15.2%(5/33)	13%(15/115)	16.2%(49/302)	20.2%(18/89)	15.6%(14/90)	0.99(0.96, 1.03)
Good place to raise children	13.1%(20/153)	18.6%(42/226)	15.1%(18/119)	17.4%(8/46)	15.3%(13/85)	1.03(0.95, 1.11)
Geographical isolation	14.5%(24/165)	14%(32/229)	23.2%(33/142)	12.9%(8/62)	12.9%(4/31)	0.98(0.91, 1.06)
Financial issues						
Offered high income	13.2%(29/219)	17.1%(51/299)	18.5%(15/81)	27.8%(5/18)	8.3%(1/12)	1.12(1.00, 1.25)
Financial incentives§	13.5%(18/133)	15.4%(45/293)	19.6%(32/163)	16.7%(4/24)	12.5%(2/16)	1.04(0.97, 1.11)
Inadequate income	15.2%(37/244)	15.6%(43/275)	18.2%(12/66)	25.9%(7/27)	11.8%(2/17)	1.08(0.98, 1.19)
Poor financial incentives§	13.2%(21/159)	13.8%(37/268)	18.1%(25/138)	28.6%(10/35)	27.6%(8/29)	0.99(0.88, 1.12)*
Cost of living	11%(11/100)	12.2%(36/296)	22.9%(35/153)	31.6%(12/38)	16.7%(7/42)	1.04(1.01, 1.08)*
Affordable housing	14.5%(17/117)	14.1%(43/304)	19%(27/142)	16.7%(4/24)	23.8%(10/42)	0.96(0.89, 1.04)

* Statistical association between rural practice and attitudinal factor

† (95% CI)=prevalence ratio (95% confidence interval)

‡ Expectations do not meet reality

§ Financial incentives other than income

Table 5-3: Factors associated with decreasing level of importance for decisions to practice in a rural area for women

Women	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)	PR	(95% CI)*
Work structures							
Heavy work load	9%(10/111)	15.4%(35/227)	18.3%(35/191)	22.2%(18/81)	15.8%(3/19)	1.09(1.02, 1.15)*	
Set up new practice	8.1%(6/74)	15.3%(25/163)	17.5%(31/177)	14.5%(16/110)	21.9%(23/105)	1.05(1.01, 1.09)*	
Work experience	18.2%(26/143)	16.1%(42/261)	10.7%(16/149)	19.6%(9/46)	26.7%(8/30)	0.90(0.79, 1.03)	
Widen skills	20.8%(31/149)	16.3%(47/288)	12.2%(17/139)	6.7%(2/30)	17.4%(4/23)	0.96(0.83, 1.11)	
Poor working conditions	13.3%(33/249)	16.5%(43/260)	17.1%(13/76)	27.3%(6/22)	27.3%(6/22)	1.15(0.97, 1.36)	
Too many on call duties	11.7%(9/77)	13.2%(25/189)	15.9%(36/227)	17.2%(15/87)	32.7%(16/49)	1.05(1.01, 1.09)*	
Flexible work hours	11%(22/200)	18.5%(61/330)	16.4%(12/73)	28.6%(4/14)	16.7%(2/12)	1.25(1.08, 1.44)*	
Long work hours	8.7%(11/126)	15.2%(35/230)	20.3%(35/172)	20%(16/80)	19%(4/21)	1.10(1.03, 1.18)*	
Workplace relations							
Inadequate supervision	11.1%(8/72)	13%(24/184)	17.8%(30/169)	23.6% (29/123)	12.3%(10/81)	1.07(1.02, 1.11)*	
Difficulties recruiting staff	12.4%(11/89)	9.8%(25/254)	22.1%(40/181)	22%(13/59)	26.1%(12/46)	1.07(1.02, 1.13)*	
Issues with colleagues	12.1%(20/165)	16.4%(37/226)	17.5%(28/160)	18.2%(8/44)	23.5%(8/34)	1.10(1.00, 1.22)*	
Lifestyle							
Personal isolation	13.5%(26/193)	15.9%(37/232)	22.9%(27/118)	11.5%(6/52)	14.7%(5/34)	1.07(0.97, 1.17)	
No employment for partner	14.1%(27/191)	18.7%(37/198)	12.3%(16/130)	17.1%(6/35)	20%(15/75)	1.09(0.99, 1.20)	
Partner career	16.2%(33/204)	16.8%(40/238)	15.9%(18/113)	10.3%(3/29)	15.6%(7/45)	0.98(0.86, 1.11)	
No employment for partner	13.7%(31/227)	18.7%39/209)	15.5%(17/110)	8.1%(3/37)	23.9%(11/46)	1.05(0.92, 1.19)	
Lack of community	13.2%(17/129)	16.5%(42/255)	13.4%(22/164)	22.2%(10/45)	27.8%(10/36)	1.09(1.02, 1.17)*	
Children's education	13%(33/253)	19.7%(37/188)	15.6%(12/77)	16.2%(6/37)	17.6%(13/74)	1.04(0.95, 1.15)	
Return to placement	18.4%(7/38)	16.3%(15/92)	13.4%(33/247)	16.5%(17/103)	19.5%(29/149)	1.01(0.98, 1.05)	
Return to hometown	15.6%(10/64)	17.4%(16/92)	11.1%(21/189)	14%(13/93)	21.5%(41/191)	1.01(0.97, 1.05)	
Social networks	14.8%(9/61)	13.1%(23/176)	16.1%(33/205)	18.8%(12/64)	19.5%(24/123)	1.03(0.99, 1.08)	
Extended family	10.6%(9/85)	15.3%(21/137)	16.4%(30/183)	16.5%(13/79)	19.3%(28/145)	1.05(1.00, 1.10)*	
Expectations‡	12.6%(18/143)	14.6%(38/261)	18.7%(28/150)	23.9%(11/46)	20.7%(6/29)	1.11(1.03, 1.21)*	
Multicultural area	15.2%(5/33)	13%(15/115)	16.2%(49/302)	20.2%(18/89)	15.6%(14/90)	1.04(0.99, 1.08)	
Good place to raise children	13.1%(20/153)	18.6%(42/226)	15.1%(18/119)	17.4%(8/46)	15.3%(13/85)	1.04(0.96, 1.11)	
Geographical isolation	14.5%(24/165)	14%(32/229)	23.2%(33/142)	12.9%(8/62)	12.9%(4/31)	1.06(0.97, 1.15)	
Financial issues							
Offered high income	13.2%(29/219)	17.1%(51/299)	18.5%(15/81)	27.8%(5/18)	8.3%(1/12)	1.11(0.98, 1.26)	
Financial incentives§	13.5%(18/133)	15.4%(45/293)	19.6%(32/163)	16.7%(4/24)	12.5%(2/16)	1.03(0.94, 1.13)	
Inadequate income	15.2%(37/244)	15.6%(43/275)	18.2%(12/66)	25.9%(7/27)	11.8%(2/17)	1.08(0.91, 1.27)	
Poor financial incentives§	13.2%(21/159)	13.8%(37/268)	18.1%(25/138)	28.6%(10/35)	27.6%(8/29)	1.02(0.92, 1.13)	
Cost of living	11%(11/100)	12.2%(36/296)	22.9%(35/153)	31.6%(12/38)	16.7%(7/42)	1.06(0.99, 1.14)	
Affordable housing	14.5%(17/117)	14.1%(43/304)	19%(27/142)	16.7%(4/24)	23.8%(10/42)	1.12(1.04, 1.20)*	

* Statistical association between rural practice and attitudinal factor
† (95% CI)=prevalence ratio (95% confidence interval)
‡ Expectations do not meet reality
§ Financial incentives other than income

6 EVIDENCE OF THE EFFECT OF RURAL BACKGROUND ON RURAL PRACTISE IN AUSTRALIAN DENTAL PRACTITIONERS: DOES GENDER PLAY A ROLE?

6.1 Preface

In this chapter, I present the quantitative findings related to the hypothesis, on the evidence of the rural background effect in Australian dental practitioners. I investigate whether dental practitioners who have a rural background more likely to work in a rural area than those who do not; and if the gender of dental practitioners play a role in the association between urban/rural background and practice location.

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6.2 Introduction

Poor oral health impacts general health; despite improvements, problems still persist. This is particularly so among disadvantaged groups such as rural populations (Wilson, Couper et al. 2009). In Australia people residing outside the capital cities have poorer oral health and less favourable dental visiting patterns than their city counterparts (Crocombe, Stewart et al. 2010). Rural communities share some characteristics that can negatively affect the manner in which health care is provided (Kruger and Tennant 2010) and rural populations attend dental services less frequently than urban populations (Silva, Phung et al. 2006). These characteristics can include increased geographic distances for travel between population centres and oral health services (Skillman, Doescher et al. 2010). Increased travel times are of particular importance as the distribution of the Australian population is skewed towards urban areas (Australian Bureau of Statistics 2013).

Dental practitioners (dentists, dental specialists, dental therapists, dental hygienists, oral health therapists, and dental prosthetists) provide important primary health care services to rural populations. Health workforce shortages and stability issues can have negative health effects for rural populations. Recruitment and retention of health practitioners has been a common problem faced in rural areas (Schoo, Stagnitti et al. 2005). For example, the Dental Board of Australia's September 2015 registrant data places the number of registered dentists at 15,933 (Dental Board of Australia 2015). Across Australia, major city areas had the highest number per 100,000 population of practising dentists (63.1) and remote areas had the lowest (25.7) (AIHW 2016). As dental practitioner numbers increase, the issue of rural dental workforce recruitment may be solving itself. There is however, potential for increased workforce turnover, as dental practitioners move away from rural into urban areas.

Several of the issues associated with workforce stability of dental practitioners reflect those outlined in other health disciplines (Humphreys, Jones et al. 2001, Kruger and Tennant 2005, Wilson, Couper et al. 2009). It is important to understand the characteristics of dental workforce mobility and the factors that can influence recruitment and retention in order to maintain a stable healthcare system. Evidence indicates that medical personnel with rural backgrounds are more likely to work in rural areas than those with urban backgrounds (Laven and Wilkinson 2003, Laven, Laurence et al. 2005, Jones, Humphreys et al. 2012). This is known as the rural background effect (RBE) (Teusner, Chrisopoulos et al. 2007, Jones, Humphreys et al. 2012). There have been strategies put in place aimed at increasing rural recruitment and retention for health practitioners. Recruitment strategies used in Australia include financial incentives (Kruger and Tennant 2005, Silva, Phung et al. 2006, Hall, Garnett et al. 2007); and retention initiatives relate to increasing prior rural exposure: increasing the number of dental students with a rural background (Silva, Phung et al. 2006), establishing rural clinical schools, and undergraduate rural placement programs (Bazen, Kruger et al. 2007, Kruger and Tennant 2010). Rural dental schools and undergraduate rural clinical placement programs aim to provide students with direct experience of rural and remote practice (Bazen, Kruger et al. 2007).

A systematic review which investigated the factors which influence rural recruitment and retention of dental practitioners found that prior rural exposure (PRE) was highly important

(Godwin, Hoang et al. 2014) Those individuals who had exposure to and experiences of rural areas were more likely to work in rural practice than those who did not. PRE refers to dental practitioners being exposed to the realities of rural practice and rural lifestyles before entering the workforce; through both rural upbringing (Kruger, Jacobs et al. 2010, McFarland, Reinhardt et al. 2012) and rural training (Bazen, Kruger et al. 2007, McFarland, Reinhardt et al. 2010). Rural dental schools and undergraduate rural clinical placement programs provide rural training for dental practitioner students. Rural training aims to provide students with direct experience of rural practice before graduation (Bazen, Kruger et al. 2007). However, there are still large gaps in the evidence base for the effectiveness of Australian health undergraduate rural placements programs (Orpin and Gabriel 2005, Eley, Synnott et al. 2012).

There has been an increase in dental graduate numbers in recent years, particularly of women. In 2015, 49% of dental practitioners in Australia were women (Dental Board of Australia 2015). The role of gender is contested in the health workforce. Laven and Wilkinson (Laven and Wilkinson 2003) found that gender was not a significant factor in three out of the nine studies reviewed, but in five of the studies, rural physicians were more likely to be men. McFarland and colleagues found that men were only slightly more likely than women to work as rural dentists; but the smaller the rural population, the odds of a women working there were increased (McFarland, Reinhardt et al. 2012). There are gender differences in dentists' working practices, on average, women work fewer hours per week than men, and are more likely to take career breaks to raise children (Ayers, Thomson et al. 2008).

This paper focuses on rural background as a predictor of rural practice, adjusting for rural clinical placement and rural dental schools due to the limited evidence of their long-term effectiveness (Orpin and Gabriel 2005, Ranmuthugala, Humphreys et al. 2007). Having such knowledge would allow for policymakers to better develop incentive programs aimed at stabilising the rural dental practitioner workforce and increasing access to oral health care for rural populations. Further research into the long-term effects of these strategies is required to increase understanding of the effectiveness of different strategies aimed at recruitment, and retention of rural dental practitioners (Mariño, Morgan et al. 2006, Wilson, Couper et al. 2009). Successful recruitment initiatives and long-term retention schemes for rural dental practitioners

are important to improve the oral health of people in disadvantaged areas (Powell, Hollis et al. 2006).

This study aims to determine whether rural background influences practice location for Australian dental practitioners in two key research questions.

- Are dental practitioners who have a rural background more likely to work in a rural area than those who do not?
- Does the gender of dental practitioners play a role in the association between urban/rural background and practice location?

6.3 Materials and Methods

Data were collected using a self-administered online cross-sectional survey. The dental practitioner groups included in the study were dentists (including specialists), dental prosthetists, dental hygienists, dental therapists, and oral health therapists. Recruitment was promoted by an advertising campaign through the Australian dental professional associations: Australian Dental Association (ADA), Dental Hygienist Association of Australia (DHAA), Australian Dental and Oral Health Therapist Association (ADOHTA), and Australian Dental Prosthetists Association (ADPA). An online survey was selected for use in this study for several reasons. Feasibility was a factor, because the area to be surveyed was geographically large. The study population had access to computers and the internet, and had appropriate computer literacy levels to navigate a survey (Kruger and Tennant 2004). Association members were emailed with an online link to the survey via Lime Survey software directly through the dental associations. To protect privacy, email information was not given to the research team.

It was estimated that a sample of 500 dental practitioners would provide 96% power to detect a stronger effect of rural background on rural practice for female practitioners than for male practitioners. The estimates of power were based on data collected in a pilot study involving 50 Australian dental practitioners. Estimate is an interaction term, the actual prevalence's in the sample allowed us to see differences in the sample. Power was estimated using the approach of

Kahn and Sempos (Kahn and Sempos 1989) and allowed for a two-sided probability of type 1 error of 5% (α=0.05). The calculations were made using the estimated coefficient and the estimated standard error of the relevant predictor in a log binomial regression model (a generalised linear model with binomial errors and log link).

The final draft of the survey questionnaire was completed after the thorough completion of the pilot study. The survey held 21 questions divided into five sections: background, recruitment, retention, turnover, and further comments.

6.4 Statistical analysis

Data analysis were undertaken using SPSS, Statistical Package for the Social Sciences, version 22. The dependent variable was rural practice computed from the postcode of the respondent's primary practice location to determine the ASGC-RA category (Australian Government Department of Health and Ageing 2012) of the area. This was then assigned either 'urban' or 'rural' classification. ASGC-RA 1 (major cities) and 2 (inner regional) were grouped as 'urban' and ASGC-RA 3 (outer regional), 4 (remote) and 5 (very remote) were grouped as 'rural'. Rural background was categorised using each respondent's self-reported designation of birthplace, or if not available, the place of previous two years of schooling prior to entering training for a dental qualification. The research team used two variables for background; birthplace, as it is a static answer, and the previous two years of schooling as it indicates whether they had moved. The categories used in analysis were Australian urban, Australian rural, and overseas. Comparisons were made of the characteristics of survey participants and of the National dental workforce as reported in the AIHW report (Australian Institute of Health and Welfare 2014).

Prevalence and prevalence ratios with 95% confidence intervals comparing demographic characteristics of participants were estimated using Poisson regression with robust standard errors. Factors with a statistically significant and/or at least moderately sized relationship with outcome were entered into mutually adjusted models. Statistical interaction was assessed from the co-efficient and standard error of a product term formed from the covariates of the two or

more factors involved. Ethics approval was obtained from the Tasmania Social Sciences Human Research Ethics Committee (H0013194).

6.5 Results

Approximately 11,300 emails were sent out, and 631 surveys (6%) were completed. Close to half (47%) of respondents were men (Table 6-1). The demographic characteristics of the respondents were similar to the 2012 National Health Workforce Report in terms of proportions of each sex, age group, practitioner type, hours worked, and workplace type (Australian Institute of Health and Welfare 2014, Funkhouser, Vellala et al. 2016). Male respondents were overwhelmingly (91%) dentists or specialists, while around half of women (51%) were dentists or specialists. Female respondents were younger than the males, and over half (56%) of the respondents had an urban background. The majority (85%) were Australian citizens, almost all (92%) had attended an Australian dental school, and many (84%) worked in urban areas.

Four demographic characteristics of women were found to be significantly associated with rural practice: rural background, workplace type, dental school attended and rural clinical placement (Table 6-2). Associations between demographic factors and rural practice were significant in the models for women. Women with an Australian rural background were more than three times (PR 3.12, p=0.020) as likely to work in rural practice as women with an Australian urban background. Female rural dental school graduates were twice (PR 2.04, p=0.021) as likely to work in rural practice as those graduates of Australian urban dental schools. Dental school refers to the location of the institute where participants received their dental qualifications; includes non-university institutions offering certifications. Female respondents who had participated in rural clinical placement programs during undergraduate training were also more likely (PR=1.74, p=0.031) to work in rural areas than those who had not. Privately-employed female practitioners were less likely (PR=0.58, p=0.028) to work in rural areas than those in other types of employment. Work place is community health clinic/government service (including defence)/hospital/university/other. Workplace type, dental school and rural clinical placement were associated with rural practice and background for women. For men, the only statistically significant contrast was between those who has attended an Australian urban dental

school and those who had attended an Australian rural dental school, with the latter more than three times more likely to be in rural practice.

In multivariable analysis (Table 6-3), women with a rural background were more than two times (PR=2.82, p=0.029) more likely to work in rural practice than women with an urban background after adjusting for other rural exposures (dental school and rural clinical placement), and workplace type. None of the variables tested were significant predictors for male respondent rural practice. There were not marked differences between the practitioner groups of dentist and specialist, and allied dental practitioner (ADP), or confounding by practitioner group, in the analysis of factors associated with rural practice. This is demonstrated in Table 6-4. It presents the prevalence and adjusted prevalence ratios for the study factors of rural background. While there are some differences, the associations are similar for dentists and for specialists, and ADPs, and tests of statistical interaction (men p=0.354, women p=0.552) did not reveal statistically significant differences in the prevalence ratios.

6.6 Discussion

This is the first study from Australia to find that the rural background was positively associated with practicing in a rural area for women, but not for men. This study adds to the small amount of research into the influences on the rural work movements of Australian dental practitioners. This result is important because it gives information to policy makers when designing strategies to increase the rural dental workforce.

The most commonly identified rural practice motivators for health professionals relate to an individual having exposure to rural areas prior to moving into a rural community for work (Laven and Wilkinson 2003). Internationally, it has been shown that for the dental practitioners having a rural background is the key predictor of the likelihood of rural practice (Silva, Phung et al. 2006, Hall, Garnett et al. 2007, McFarland, Reinhardt et al. 2012). Australian rural workforce initiatives assume that PRE is also an influential component for dental practitioners, without any empirical evidence supporting this claim (Godwin, Hoang et al. 2014). This study tests this theory, and demonstrates that female dental practitioners with a rural background were more likely to work in rural areas than those with urban backgrounds. Though there are some

similarities between the Australian rural medical workforce and the rural dental workforce, there are several key differences. Dental care is provided differently to medical care, the latter being mainly government subsidised. In Australia, dental services are largely provided by the private sector (85%) (Kruger and Tennant 2015), and cost is a common reason for people to avoid dental treatment (Harford, Ellershaw et al. 2011). A dental practitioner requires a larger patient base than a medical practitioner to be financially viable resulting in the many widely-dispersed rural areas in Australia not having the population size needed to support a full-time dental practitioner (Barnett, Hoang et al. 2015).

American research demonstrated that having a dental school in a state and increasing the number of local dental students significantly correlates with the number of dentists in that state (Byck, Kaste et al. 2006). McFarlane (McFarland, Reinhardt et al. 2010) suggested that policymakers may view universities as having the ability to improve rural populations' access to dental care by enrolling additional local students. The practice of preferential student selection from rural areas is followed in Australia by some dental schools. McFarlane (McFarland, Reinhardt et al. 2010) further suggested that understanding the influence individual background and gender has upon location of practice could affect access to care for rural populations. There are gender differences in personal and work characteristics of dentists, and women are less likely to work in rural areas (Kruger and Tennant 2004, McFarland, Reinhardt et al. 2012, Australian Institute of Health and Welfare 2014).

In most Westernised countries there has been an increasing percentage of women undertaking dental practitioner degrees in recent years (McFarland, Reinhardt et al. 2010, Pacey 2014). There are different workplace drivers for female practitioners compared with males (Kruger and Tennant 2005, McFarland, Reinhardt et al. 2012). McFarland and colleagues (McFarland, Reinhardt et al. 2010) found that female dentists who studied at the University of Nebraska and then practiced in Nebraska were more likely than men to work in rural areas. Subsequent research found that the likelihood of a rural area having a female dentist increased as the population decreased (McFarland, Reinhardt et al. 2012). In Australia, the percentage of female dentists was higher for those who worked primarily in the most rural of the ASGC-RA classifications (Teusner, Chrisopoulos et al. 2007). Both genders are strongly influenced by

professional issues, but women are more likely than men to factor in family considerations, such as flexibility in working hours and access to childcare when making work decisions. Kruger and Tennant (Kruger and Tennant 2005) found that there were differences between male and female dentists regarding rural practice recruitment factors. Women were more likely to follow their partners to a rural area, rather than be the driver of work location movements. Reasons for this were suggested to be because male dentists were more likely to be the main income provider in a relationship and women were more likely to take time away from paid work to raise children (Kruger and Tennant 2005, Pacey 2014).

Universities and policy makers may find the results of this study very useful as they aim to address the maldistribution of the dental practitioner workforce, and the health needs of rural populations. This study also highlights a key structural change in the future: there is an increase in the proportion of women entering the dental workforce in Australia. Given this change, the structure of rural dental healthcare provision needs to meet the needs of women. The findings from this study indicate that policy makers and universities attempting to increase rural recruitment and retention in the future could do so by selecting more women with a rural background.

There is inconclusive evidence regarding the specifics of PRE and increased likelihood of rural practice (Ranmuthugala, Humphreys et al. 2007), as a result, the implicit reasons why rural background was such a strong predictor for rural practice remain unknown. Individuals with rural backgrounds could possess an increased ability to socialise and acculturate to the rural environment and have pre-existing local social support networks (Jones, Humphreys et al. 2012). Those who displayed uncertainty towards working in rural communities could do so because of unfamiliarity with the rural lifestyle (Somers, Strasser et al. 2007), so prior exposure to the realities of rural life can facilitate the ability to assimilate (Jones, Humphreys et al. 2012). Dental practitioners who were from rural areas were already aware of the particular intricacies of rural lifestyle specific to their home community, and the community's health needs (Daniels, VanLeit et al. 2007). Having experiences of living and working in rural practice could provide dental practitioners with knowledge and experience of the realities of living in rural areas as well as experience of the clinical and administrative expectations of working in rural areas as

they are different to urban practice (Bazen, Kruger et al. 2007). If these experiences are positive and rewarding, it would then positively influence both rural recruitment and retention (Bazen, Kruger et al. 2007). Dissatisfaction with rural practice can stem from its failure to meet expectations based upon limited experience and exposure to the realities of rural life. Previous Australian dental workforce studies also supported this, with the desire to return to the practitioners' hometown, closeness to family and friends and lifestyle being associated with rural practice decisions (Kruger and Tennant 2005, Silva, Phung et al. 2006). The findings of this study indicate that rural background can be a strong predictor of rural practice.

The sample size was small relative to the number of dental practitioners in Australia, but sufficient to provide adequate power for the intended analyses. The sampling frame was limited to members of professional dental associations, but it covers over 60% of the study population. The low response proportion is a further limitation, because we cannot discount the possibility that non-responders were differentially influenced in their decision to practice or not to practice in a rural location by the factors identified as having influenced the respondents. If that is the case, our results are not generalizable beyond the subpopulation of dental practitioners represented by our sample. They were members of professional associations with current email addresses and who were sufficiently motivated by an impersonal email from their dental association inviting them to participate in a web-based survey. It was reassuring in this respect that our survey participants were representative of the national dental workforce in terms of proportions of each sex, age group, practitioner type, hours worked, and workplace type (Australian Institute of Health and Welfare 2014, Funkhouser, Vellala et al. 2016). Finally, the cross-sectional study design does not support attrition of causation in the associations identified. Researchers need to bear in mind that there has been a historical decline in response to surveys of health professionals (Funkhouser, Vellala et al. 2016) due in part to privacy concerns. Nonetheless, our results suggest that low response proportions need not preclude a representative sample of computer literate health professionals. The prevalence of rural practice did not differ greatly by practitioner type in this study, particularly among women, and the associations of the other study factors with rural practice were not modified by practitioner type, but we had relatively few male ADPs on which to base this conclusion. The variables

indicating background (birthplace and location of schooling) were best fit to act as an overall indicator for background. Further research could entail a larger sample size of all registered dental practitioners, and a longitudinal study following the practice location movements of dental practitioners from graduation onwards, including their rural background status (locations of pre-school, primary, and high school), their dental school, and rural clinical placement participation record. This study adds new knowledge to the previously untested predictors of rural practice for Australian dental practitioners. Further research would greatly strengthen the knowledge on PRE and rural practice in dental practitioners.

6.7 Conclusions

There was evidence of the rural background effect in female Australian dental practitioners. Female dental practitioners who themselves had an Australian rural background were more than twice as likely as those who had urban backgrounds to work in rural practice. The gender of dental practitioners plays a role in the RBE.

6.8 Postscript

In this chapter, I investigated whether dental practitioners who have a rural background were more likely to work in a rural area than those who do not have a rural background; and whether the gender of dental practitioners played a role. I identified a range of demographic characteristics that were associated with rural practice: rural background, working in private practice, location of dental school, and participating in a rural clinical placement during undergraduate training. There were some imperfect study factors, and a relatively low response proportion. Despite these limitations, this study demonstrated that female Australian rural background dental practitioners were more likely to work in rural practice than female Australian urban background and female overseas background dental practitioners. In the next chapter **(Chapter 7)**, I will outline the supplementary results from both the interviews and the surveys.

6.9 Tables

Table 6-1: Characteristics of participants

Characteristic	Male % (n/N)	Female % (n/N)
Sex	47.1% (297/631)	52.9% (334/631)
Background		
Urban Australia *	49.5% (147/255)	46.7% (156/286)
Rural Australia †	4.4% (13/255)	6.0% (20/286)
Overseas	32.0 % (95/255)	32.9% (110/286)
Residential status		
Australian citizen	93.3% (277/297)	91.9% (307/334)
Resident ‡	6.7% (20/297)	8.1% (27/334)
Family status		
Partner and children	66.0% (196/297)	50.2% (166/331)
Partner, no children	13.5% (40/297)	23.9% (79/331)
Single and other	20.5% (61/297)	25.9% (86/331)
Professional group		
Dentist	75.1% (223/297)	48.2% (161/334)
Oral health therapist	2.0% (6/297)	12.3% (41/334)
Therapist	0.7% (2/297)	15.9% (53/334)
Hygienist	0.7% (2/297)	13.4% (45/334)
Prosthetist	6.0% (18/297)	2.4% (8/334)
Specialist	15.5% (46/297)	3.0% (10/334)
Hygienist & Therapist	0.0% (0/297)	4.8% (16/334)
Age group		
< 35 years	14.5% (43/297)	30.8% (103/334)
35 – 44 years	8.1% (24/297)	22.2% (74/334)
45 – 54 years	24.6% (73/297)	28.1% (94/334)
55 – 64 years	35.0% (104/297)	16.2% (54/334)
65 – 74 years	16.1% (48/297)	2.4% (8/334)
> 75 years	1.7% (5/297)	0.3% (1/334)
Workplace type§		
Private	79.8% (237/297)	59.9% (200/334)
Government	7.4% (22/297)	14.4% (48/334)
Community health clinic	1.0% (3/297)	10.8% (36/334)
Hospital	3.0% (9/297)	3.9% (13/334)
University	5.7% (17/297)	6.3% (21/334)
Other	3.0% (9/297)	4.8% (16/334)
Time at workplace‖		
<5 years	28.3% (84/297)	46.6% (156/334)
5 – 10 years	12.1% (36/297)	23.1% (77/334)
10 -15 years	13.5% (40/297)	11.7% (39/334)
>15 years	46.1% (137/297)	18.6% (62/334)
Work hours¶		
<20 hours	10.1% (30/297)	16.8% (56/334)
>20 but <30 hours	23.9% (71/297)	41.6% (139/334)
>30 hours	66.0% (196/297)	41.6% (139/334)
Student debt**		
No	75.1% (223/297)	60.5% (202/334)
Yes	24.9% (74/297)	39.5% (132/334)
Dental school		
Australian urban	90.6% (269/297)	89.5% (287/334)
Australian rural	1.3% (4/297)	5.4% (18/334)
Overseas	8.1% (24/297)	8.4% (8/334)
Location of work		
Urban††	83.5% (248/295)	83.8% (280/334)
Rural‡‡	15.8% (47/295)	16.2% (54/334)

Rural clinical placement§§		
No	83.5% (248/297)	70.1% (234/334)
Yes	16.5% (49/297)	29.9% (100/334)

*Australian background ASGC-RA category 1 (major cities) or 2 (inner regional)
†Australian background ASGC-RA category 3 (outer regional) or 4 (remote) or 5 (very remote)
‡ Permanent or temporary resident in Australia
§ Primary workplace categorical type
|| Length of time at current workplace (years)
¶ Average number of hours worked a week
** Had a higher education loan or student debt
†† Working in an ASGC-RA 1 (major cities) or 2 (inner regional)
‡‡ Working in an ASGC-RA 3 (outer regional) or 4 (remote) or 5 (very remote)
§§ Participated in a rural clinical placement program during undergraduate training

Table 6-2: Factors associated with working in a practice located in a rural area

	Male		Female	
Study factor	**% (n/N)**	**PR (95% CI) ***	**% (n/N)**	**PR (95% CI)**
Background				
Urban Australia †	12.3% (18/146)	1.00	12.8% (20/156)	1.00
Rural Australia ‡	30.8% (4/13)	2.50 (0.99, 6.28)	40.0% (8/20)	3.12 (1.59, 6.13)
Overseas	20.2% (19/94)	1.64 (0.91, 2.96)	15.5% (17/110)	1.21 (0.66, 2.19)
p value		*p*=0.107		*p*=0.020
Residential status				
AUS citizen	15.6% (43/275)	1.00	16.0% (49/307)	1.00
Resident§	23.3% (4/20)	1.28 (0.21, 3.21)	18.5% (5/27)	1.16 (0.51, 2.67)
p value		*p*=0.471		*p*=0.598
Family status				
Other‖	20.0% (16/80)	1.00	16.4% (26/159)	1.00
Family and children¶	14.4% (31/217)	0.72 (0.42, 1.25)	16.0% (28/175)	0.98 (0.60, 1.60)
p value		*p*=0.253		*p*=0.930
Professional group				
ADP**	7.1% (2/28)	1.00	15.3% (25/163)	1.00
Dentist and specialist	16.9% (45/267)	2.36 (0.61, 9.21)	17.0% (29/171)	1.11 (0.68, 1.81)
p value		*p*=0.145		*p*=0.687
Age group				
< 45 years	16.4% (11/67)	1.00	18.1% (32/177)	1.00
45 to 54	12.3% (9/73)	0.75 (0.33, 1.70)	12.8% (12/94)	0.71 (0.38, 1.31)
> 55 years	17.4% (27/157)	1.06 (0.56, 2.01)	15.9% (10/63)	0.88 (0.46, 1.68)
trend		*p*=0.601		*p*=0.517
Workplace type				
Other††	19.0% (11/58)	1.00	21.6% (29/134)	1.00
Private	15.2% (36/237)	0.80 (0.44, 1.48)	12.5% (25/200)	0.58 (0.36, 0.94)
p value		*p*=0.489		*p*=0.028
Time at workplace‡‡				
<5 years	18.3%(15/82)	1.00	18.6% (29/156)	1.00
5 – 10	13.9%(5/36)	0.76 (0.30, 1.93)	15.6% (12/77)	0.84 (0.45, 1.55)
>10 years	15.3%(27/177)	0.83 (0.47, 1.48)	12.9% (13/101)	0.69 (0.38, 1.27)
trend		*p*=0.776		*p*=0.466
Work hours§§				
<20 hours	10.3% (3/29)	1.00	14.3% (8/56)	1.00
>20 but <30 hours	20.0% (14/70)	1.93 (0.60, 6.23)	15.1% (21/139)	1.06 (0.50, 2.25)
>30 hours	15.3% (30/196)	1.48 (0.48, 4.54)	18.0% (25/139)	1.26 (0.61, 2.62)
trend		*p*=0.920		*p*=0.456
Student debt ‖‖				
No	15.4% (34/221)	1.00	17.3% (35/202)	1.00
Yes	17.6% (13/74)	1.14 (0.64, 2.04)	14.4% (19/132)	0.83 (0.50, 1.39)
p value		*p*=0.655		*p*=0.749
Dental school				
Australia urban	14.9% (40/286)	1.00	16.4% (47/287)	1.00
Australia rural	50.0% (2/4)	3.35 (1.21, 9.30)	33.3% (6/18)	2.04 (1.01, 4.13)
Overseas	21.7% (5/23)	1.46 (0.64, 3.33)	3.6% (1/28)	0.21 (0.03, 1.53)
p value		*p*=0.199		*p*=0.021
Rural clinical placement¶¶				
No	15.4% (38/246)	1.00	13.2% (31/234)	1.00
Yes	18.4% (9/49)	1.19 (0.62, 2.30)	23.0% (23/100)	1.74 (1.07, 2.82)
p value		*p*=0.616		*p*=0.031

* PR(95% CI)=prevalence ratio (95% confidence interval)

† Australian background ASGC-RA category 1 (major cities) or 2 (inner regional)

‡ Australian background ASGC-RA category 3 (outer regional) or 4 (remote) or 5 (very remote)

§ Permanent or temporary resident in Australia

‖ In a relationship (married/defacto) without child(ren) or single with(out) child(ren) or other

¶ In a relationship (married/defacto) with child(ren) (at home/grown up)

** Allied dental practitioner (therapist, hygienist, oral health therapist, prosthetist)

†† Work place is community health clinic/government service (including defence)/hospital/university/other
‡‡ Length of time at current workplace (years)
§§ Average number of hours worked a week
|||| Existence of a previous or current higher education loan or student debt from dental qualification
¶¶ Participation in a rural clinical placement program during undergraduate training

Table 6-3: Multivariable analysis of factors associated with working in a practice located in a rural area

	Male		Female	
Study factor	**% (n/N)**	**PR (95% CI)***	**% (n/N)**	**PR (95% CI)**
Background				
Urban Australia †	12.3% (18/146)	1.00	12.8% (20/156)	1.00
Rural Australia ‡	30.8% (4/13)	2.23 (0.79, 6.26)	40.0% (8/20)	2.82 (1.35, 5.87)
Overseas	20.2% (19/94)	1.65 (0.87, 3.11)	15.5% (17/110)	1.48 (0.82, 2.68)
p value		*p*=0.231		*p*=0.069
Workplace type				
Other §	19.0% (11/58)	1.00	21.6% (29/134)	1.00
Private practice work type	15.2% (36/237)	0.98 (0.50, 1.92)	12.5% (25/200)	0.64 (0.37, 1.11)
p value		*p*=0.950		*p*=0.148
Dental school				
AUS urban dental school	14.9% (40/286)	1.00	16.4% (47/287)	1.00
AUS rural dental school	50.0% (2/4)	3.16 (0.73, 13.62)	33.3% (6/18)	1.13 (0.44, 2.87)
Overseas dental school	21.7% (5/23)	1.17 (0.48, 2.87)	3.6% (1/28)	0.22 (0.03, 1.57)
p value		*p*=0.439		*p*=0.192
Rural clinical placement‖				
No	15.4% (38/246)	1.00	13.2% (31/234)	1.00
Yes	18.4% (9/49)	1.02 (0.49, 2.13)	23.0% (23/100)	1.45 (0.84, 2.50)
p value		*p*=0.950		*p*=0.271

* PR(95% CI)=prevalence ratio (95% confidence interval) adjusted for the other study factors in the table
† Australian background ASGC-RA category 1 (major cities) or 2 (inner regional)
‡ Australian background ASGC-RA category 3 (outer regional) or 4 (remote) or 5 (very remote)
§ Work place is community health clinic/government service (including defence)/hospital/university/other
‖ Participation in a rural clinical placement program during undergraduate training

Table 6-4: Stratified multivariable analysis of work types associated with working in a practice located in a rural area

	Male		Female	
Study factor	**% (n/N)**	**PR (95% CI)***	**% (n/N)**	**PR (95% CI)**
Dentist				
Background				
Urban Australia †	13.9% (15/108)	1.00	12.3% (8/65)	1.00
Rural Australia ‡	30.0% (3/10)	1.94 (0.58, 6.43)	66.7% (4/6)	6.07 (1.98, 18.63)
Overseas	25.0% (19/76)	1.80 (0.91, 3.57)	16.0% (12/75)	1.60 (0.70, 3.68)
p value		*p*=0.647		*p*=0.053
Allied Dental Practitioner				
Background				
Urban Australia	7.1% (1/14)	1.00	13.2% (12/91)	1.00
Rural Australia	7.9% (3/38)	NA NA	28.6% (4/14)	1.86 (0.68, 5.09)
Overseas	33.3% (1/3)	NA NA	14.3% (5/35)	1.35 (0.54, 3.35)
p value		NA		*p*=0.572

* PR(95% CI)=prevalence ratio (95% confidence interval) adjusted for workplace type, dental school, and rural clinical placement
† Australian background ASGC-RA category 1 (major cities) or2 (inner regional).
‡ Australian background ASGC-RA category 3 (outer regional) or 4 (remote) or 5 (very remote)

7 SUPPLEMENTARY RESULTS

7.1 Preface

This section will present supplementary results from the interviews and surveys that were unable to be included in the publications due to word limitations but remain relevant to the data analysis. This section will provide descriptive statistics of the respondent's demographic characteristics, the rural experiences of dental practitioners, the opinions of dental practitioners, and analysis of the factors that were found to be important to respondents' experiences and opinions was then conducted. The results included in this section are the exclusion criteria for the systematic literature review, the complete list of themes identified in the qualitative research phase, the full descriptive results from the level of importance factors for decisions to practice in a rural area for men and women, and the full list of the factors associated with level of importance for decisions to practice in a rural area for men and women.

7.2 Tables

The full exclusion criteria and the reasons for exclusion for the systematic literature review is provided in Table 7-1.

Table 7-1: SUPPLEMENTARY RESULTS - exclusion criteria for literature review

Study	**Reason for exclusion**
(ADA, 2006)	Inappropriate focus: dental students
(Andersen, Carreon et al. 2010)	Inappropriate focus: dental students
(Ayers, Thomson, Whyman, Rich, & Newton, 2008)	Inappropriate focus: outlined trends
(Bazen, Kruger, Dyson, & Tennant, 2007)	Inappropriate focus: dental students
(Beetstra et al. 2002)	Inappropriate focus: opinion
(Collins, Cunningham, Moles, Galloway, & Hunt, 2009)	Inappropriate focus: orthodontists
(Gallagher, Clarke et al. 2007)	Inappropriate focus: dental students
(Gallagher and Wilson 2009)	Inappropriate focus: opinion
(Johnson & Blinkhorn, 2011)	Inappropriate focus: dental students
(Krause, Mosca, & Livingston, 2003)	Inappropriate focus: traditional dental delivery models
(Kruger & Tennant, 2010)	Inappropriate focus: dental students
(Lopez, Self et al. 2009)	Inappropriate focus: potential dental students
(Lyle, Klineberg et al. 2007)	Inappropriate focus: assessment tool for universities
(Mentasti & Thibodeau, 2008)	Inappropriate focus: potential dental students
(Osborne and Haubenreich 2003)	Inappropriate outcome: inconsistent results
(Powell, Hollis et al. 2006)	Inappropriate focus: outlines oral health initiative
(Schwartz 2007)	Inappropriate outcome: subject shows inadequate results
(Skinner, Massey et al. 2009)	Inappropriate focus: potential dental students
(Sprod and Boyles 2003)	Inappropriate focus: professionals complementary to dentistry
(Walker, Duley et al. 2008)	Inappropriate focus: assessment tool for universities

The full exclusion criteria and the reasons for exclusion for the updated systematic literature review is provided in Table 7-2.

Table 7-2: SUPPLEMENTARY RESULTS-Appendix A-exclusion criteria for updated literature review

Study	**Reason for exclusion**
(Shiikha, Kruger et al. 2015)	Inappropriate focus: geographical location
(Barnett, Hoang et al. 2016)	Inappropriate focus: GPs

The complete major themes and sub-themes of the interviews conducted in the qualitative phase is provided in Table 7-3.

Table 7-3: SUPPLEMENTARY RESULTS-Complete major themes and sub-themes of qualitative approach (interviews)

1 Major themes	2 Sub-themes	3 Sub-themes
Business Case [50-397]		
	Sustainability [40-151]	Financial viability [37-88]
		Utilisation patterns [18-38]
		Business opportunity [13-25]
	Employment scarcity and security [35-93]	Employment opportunities [29-59]
		Oversupply [18-34]
	Professional isolation costs [34-88]	Professional support and networking 23-43]
		Access and travel [21-45]
	Financial incentives [35-65]	Money [23-42]
		Support packages [24-33]
Differences in clinical practices [43-233]		
	Clinical development [40-126]	Professional mentoring [28-53]
		Professional development [22-35]
		Professional support [15-23]
		Career progression [10-15]
	Job satisfaction [28-64]	Professional reward [19-31]
		Adventure and challenge [12-21]
		Clinical pride [12-12]
	Clinical procedures [22-43]	Skills and scope [18-31]
		Procedures [6-12]
Community [50-273]		
	Place integration [45-204]	Social Isolation [41-112]
		Belonging and fitting in [31-79]
		Ethnicity [7-13]
	Patients [35-69]	Interpersonal relationships [22-34]
		Health attitudes [17-24]
		Patient income [8-11]
Individual factors [50-440]		
	Local area provision [46-194]	Children [31-56]
		Spouse/partner [27-54]
		Access [18-33]
		Individual needs [10-18]
		Social activities [10-13]
		Family [9-12]
		Geography and climate [7-8]
	Background and upbringing [39-158]	Rural background [33-79]
		Urban background [29-48]
		Rural experience [22-31]
	Quality of life [40-88]	Lifestyle rewards [28-56]
		Enjoyment [27-32]

The full list of the level of importance factors for decisions to practice in a rural area for men is provided in Table 7-4.

Table 7-4: SUPPLEMENTARY RESULTS Level of importance factors for decisions to practice in a rural area for men

Men 47.1% (297/631)	**Very important %(n/N)**	**Important %(n/N)**	**Neutral %(n/N)**	**Unimportant %(n/N)**	**Not at all important %(n/N)**
Offered high income	35.7 %(106/297)	41.8%(124/297)	16.5%(49/297)	3.0%(9/297)	3.0%(9/297)
Financial incentives*	19.5%(58/297)	40.7%(121/297)	30.6%(91/297)	5.1%(15/297)	4.0%(12/297)
Underserved area†	9.8 %(29/297)	44.4 %(132/297)	32.0 %(95/297)	9.1 %(27/297)	4.7%(14/297)
Set up new practice	15.5%(46/297)	32.3%(96/297)	28.6%(85/297)	14.1%(42/297)	9.4%(28/297)
Limited work elsewhere	9.4%(28/297)	44.1%(131/297)	32.0%(95/297)	6.1%(18/297)	8.4%(25/297)
Multidisciplinary team	6.7%(20/297)	30.6%(91/297)	36.0%(107/297)	17.5%(52/297)	9.1%(27/297)
Enjoyable patients	25.9%(77/297)	50.5%(150/297)	17.8%(53/297)	3.0%(9/297)	2.7%(8/297)
Desire for work experience	18.5%(55/297)	40.4%(120/297)	25.3%(75/297)	8.4%(25/297)	7.4%(22/297)
Desire to widen skills	16.8%(50/297)	45.1%(134/297)	26.9%(80/297)	6.1%(18/297)	5.1%(15/297)
Career development	13.1%(39/297)	40.4%(120/297)	32.0%(85/297)	6.4%(19/297)	8.1%(24/297)
Experience new area	9.4%(28/297)	44.1%(131/297)	32.0%(95/297)	6.1%(18/297)	8.4%(25/297)
Return to placement	4.7%(14/297)	11.4%(34/297)	39.4%(117/297)	16.8%(50/297)	27.6%(82/297)
Return to hometown	6.1%(18/297)	11.4%(34/297)	29.6%(88/297)	13.8%(41/297)	39.1%(116/297)
Social networks	6.7%(20/297)	22.9%(68/297)	35.4%(105/297)	9.1%(27/297)	25.9%(77/297)
Extended family	8.8%(26/297)	17.5%(52/297)	30.0%(89/297)	12.8%(38/297)	31.0%(92/297)
Desire to live in region	12.8%(38/297)	42.4%(126/297)	25.3%(75/297)	7.1%(21/297)	12.5%(37/297)
Cost of living	10.8%(32/297)	41.8%(124/297)	29.3%(87/297)	8.1%(24/297)	10.1%(30/297)
Multicultural area	4.4%(3/297)	12.8%(38/297)	48.8%(145/297)	14.8%(44/297)	19.2%(57/297)
Good place to raise children	22.9%(68/297)	38.0%(113/297)	19.5%(58/297)	7.1%(21/297)	12.5%(37/297)
Affordable housing	11.8%(35/297)	47.8%(142/297)	24.6%(73/297)	5.4%(16/297)	10.4%(31/297)
Employment for partner	18.2%(54/297)	32.0%(95/297)	26.3%(78/297)	7.7%(23/297)	15.8%(47/297)
Desire for rural lifestyle	16.5%(49/297)	46.8%(139/297)	24.2%(72/297)	6.4%(19/297)	6.1%(18/297)
Teamwork	33.7%(100/297)	47.8%(142/297)	14.8%(44/297)	1.7%(5/297)	2.0%(6/297)
Flexible work hours	21.5%(64/297)	55.9%(166/297)	16.5%(49/297)	3.7%(11/297)	2.4%(7/297)
Financial incentives	32.7%(97/297)	48.8%(145/297)	15.2%(45/297)	1.3%(4/297)	2.0%(6/297)
Current income suitable	35.7%(106/297)	50.5%(150/297)	11.8%(35/297)	1.3%(4/297)	0.7%(2/297)
Enjoy rural lifestyle	26.9%(80/297)	47.8%(142/297)	18.5%(55/297)	3.4%(10/297)	3.4%(10/297)
Sense of belonging in area	27.6%(82/297)	51.2%(152/297)	16.2%(48/297)	1.7%(5/297)	3.4%(10/297)
Feeling valued by community	33.3%(99/297)	49.5%(147/297)	13.1%(39/297)	1.7%(5/297)	2.4%(7/297)
Good working conditions	30.3%(90/297)	56.6%(168/297)	9.8%(29/297)	0.7%(2/297)	2.7%(8/297)
Family is happy in area	50.8%(151/297)	37.4%(111/297)	7.4%(22/297)	1.3%(4/297)	3.0%(9/297)
Workplace autonomy	25.9%(77/297)	56.9%(169/297)	13.5%(40/297)	1.3%(4/297)	2.4%(7/297)

*Offered financial incentives other than income
†Desire to work in an underserved areas

SUPPLEMENTARY RESULTS Level of importance factors for decisions to practice in a rural area for men

Men	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)
Limited access to CPD*	21.5%(64/297)	41.1%(122/297)	20.9%(62/297)	11.8%(35/297)	4.7%(14/297)
Long work hours	16.5%(49/297)	31.6%(94/297)	35.7%(106/297)	12.1%(36/297)	4.0%(12/297)
Inadequate supervision	8.4%(25/297)	19.9%(59/297)	33.3%(99/297)	19.9%(59/297)	18.5%(55/297)
Poor working conditions	30.6%(91/297)	41.4%(123/297)	16.5%(49/297)	5.4%(16/297)	6.1%(18/297)
Inadequate income	33.3%(99/297)	40.7%(121/297)	14.8%(44/297)	7.1%(21/297)	4.0%(12/297)
Children's education†	41.1%(122/297)	29.3%(87/297)	15.2%(45/297)	5.1%(15/297)	9.4%(28/297)
Lack of locums	13.8%(41/297)	34.0%(101/297)	33.3%(99/297)	12.5%(37/297)	6.4%(19/297)
Professional isolation	22.6%(67/297)	35.7%(106/297)	26.6%(79/297)	9.1%(27/297)	6.1%(18/297)
Deskilling‡	10.4%(31/297)	26.6%(79/297)	36.4%(108/297)	14.8%(44/297)	11.8%(35/297)
Poor financial incentives	21.9%(65/297)	49.5%(147/297)	13.1%(39/297)	1.7%(5/297)	2.4%(7/297)
Expectations§	20.5%(61/297)	35.0%(104/297)	31.0%(92/297)	7.1%(21/297)	6.4%(19/297)
Desire to do further study	15.8%(47/297)	32.7%(97/297)	30.0%(89/297)	10.1%(30/297)	11.4%(34/297)
Difficulties recruiting staff	13.5%(40/297)	40.7%(121/297)	30.3%(90/297)	6.7%(20/297)	8.8%(26/297)
Heavy work load	14.8%(44/297)	30.6%(91/297)	37.7%(112/297)	13.1%(39/297)	3.7%(11/297)
Issues with colleagues	19.9%(59/297)	34.0%(101/297)	30.3%(90/297)	7.7%(23/297)	8.1%(24/297)
Too many on call duties	11.4%(34/297)	30.6%(91/297)	36.7%(109/297)	13.1%(39/297)	8.1%(24/297)
Job offered elsewhere	12.8%(38/297)	28.6%(85/297)	43.1%(128/297)	6.4%(19/297)	9.1%(27/297)
Lack of community	18.5%(55/297)	35.7%(106/297)	30.3%(90/297)	6.4%(193/297)	9.1%(27/297)
Regulations‖	16.8%(50/297)	33.7%(100/297)	30.0%(89/297)	10.8%(32/297)	8.8%(26/297)
Geographical isolation	26.6%(79/297)	31.6%(94/297)	24.6%(73/297)	10.4%(31/297)	6.7%(20/297)
Personal isolation	26.6%(79/297)	33.7%(100/297)	22.9%(68/297)	9.1%(27/297)	7.7%(23/297)
No employment for partner	23.9%(71/297)	35.4%(105/297)	24.2%(72/297)	6.7%(20/297)	9.8%(29/297)
Professional risk¶	10.4%(31/297)	22.6%(67/297)	37.4%(111/297)	17.5%(52/297)	12.1%(36/297)
Partner career	23.6%(70/297)	37.4%(111/297)	25.6%(76/297)	4.4%(13/297)	9.1%(27/297)

* Limited access to professional development opportunities
† Lack of education opportunities for children
‡ Concern about deskilling
§ Expectations do not meet reality
§ Intent to take on further study
‖ Difficulties with increasing regulations for procedures
¶ Increased professional risk

The full list of the level of importance factors for decisions to practice in a rural area for women is provided in Table 7-5.

Table 7-5: SUPPLEMENTARY RESULTS Level of importance factors for decisions to practice in a rural area for women

Women 52.9% (334/631)	**Very important %(n/N)**	**Important %(n/N)**	**Neutral %(n/N)**	**Unimportant %(n/N)**	**Not at all important %(n/N)**
Offered high income	34.1%(114/334)	52.4%(175/334)	9.9%(33/334)	2.7% (9/334)	0.9%(3/334)
Financial incentives*	22.5%(75/334)	51.8%(173/334)	21.9 %(73/334)	2.7%(9/334)	1.2%(4/334)
Underserved area†	20.1%(67/334)	48.2%(161/334)	26.9%(90/334)	2.7%(9/334)	2.1%(7/334)
Set up new practice	8.4%(28/334)	20.4%(68/334)	27.8%(93/334)	20.4%(68/334)	23.1%(77/334)
Limited work elsewhere	17.1%(57/334)	44.3%(148/334)	32.0%(107/334)	3.9%(13/334)	2.7%(9/334)
Multidisciplinary team	18.6%(62/334)	43.7%(146/334)	26.3%(88/334)	8.1%(27/334)	3.3%(11/334)
Enjoyable patients	33.5%(112/334)	51.8%(173/334)	10.2%(34/334)	3.6%(12/334)	0.9%(3/334)
Desire for work experience	26.3%(88/334)	42.5%(142/334)	22.2%(74/334)	6.3%(21/334)	2.7%(9/334)
Desire to widen skills	29.6%(99/334)	46.4%(155/334)	18.0%(60/334)	3.6%(12/334)	2.4%(8/334)
Career development	28.7%(96/334)	41.3%(138/334)	20.7%(69/334)	6.3%(21/334)	3.0%(10/334)
Experience new area	17.1%(57/334)	44.3%(148/334)	32.0%(107/334)	3.9%(13/334)	2.7%(9/334)
Return to placement	7.2%(24/334)	17.4%(58/334)	39.2%(131/334)	15.9%(53/334)	20.4%(68/334)
Return to hometown	13.8%(46/334)	17.4%(58/334)	30.5%(102/334)	15.6%(52/334)	22.8%(76/334)
Social networks	12.3%(41/334)	32.3%(108/334)	30.2%(101/334)	11.1%(37/334)	14.1%(47/334)
Extended family	17.7%(59/334)	25.4%(85/334)	28.4%(95/334)	12.3%(41/334)	16.2%(54/334)
Desire to live in region	17.7%(59/334)	47.9%(160/334)	24.0%(80/334)	5.1%(17/334)	5.4%(18/334)
Cost of living	20.4%(68/334)	51.5%(172/334)	20.4%(68/334)	4.2%(14/334)	3.6%(12/334)
Multicultural area	6.0%(20/334)	23.1%(77/334)	47.3%(158/334)	13.5%(45/334)	10.2%(34/334)
Good place to raise children	25.4%(85/334)	34.1%(114/334)	18.6%(62/334)	7.5%(25/334)	14.4%(48/334)
Affordable housing	24.6%(82/334)	48.5%(162/334)	21.3%(71/334)	2.4%(8/334)	3.3%(11/334)
Employment for partner	41.0%(137/334)	30.8%(105/334)	15.9%(53/334)	3.9%(13/334)	8.4%(28/334)
Desire for rural lifestyle	21.9%(73/334)	44.3%(148/334)	23.7%(79/334)	5.7%(19/334)	4.5%(15/334)
Teamwork	52.7%(176/334)	43.1%(144/334)	3.0%(10/334)	0.3%(1/334)	0.9%(3/334)
Flexible work hours	40.7%(136/334)	49.4%(165/334)	7.5%(25/334)	0.9%(3/334)	1.5%(5/334)
Financial incentives	37.7%(126/334)	51.8%(173/334)	9.0%(30/334)	0.6%(2/334)	0.9%(3/334)
Current income suitable	41.0%(137/334)	50.9%(170/334)	6.6%(22/334)	0.6%(2/334)	0.9%(9/334)
Enjoy rural lifestyle	23.7%(79/334)	45.8%(153/334)	23.7%(79/334)	4.2%(14/334)	2.7%(9/334)
Sense of belonging in area	28.1%(94/334)	53.3%(178/334)	14.1%(47/334)	2.7%(9/334)	1.8%(6/334)
Feeling valued by community	44.3%(148/334)	49.4%(165/334)	5.1%(17/334)	0.0%(0/334)	1.2%(4/334)
Good working conditions	47.0%(157/334)	49.7%(166/334)	1.5%(5/334)	0.6%(2/334)	1.2%(4/334)
Family is happy in area	57.8%(193/334)	34.1%(114/334)	6.6%(22/334)	0.6%(2/334)	0.9%(3/334)
Workplace autonomy	37.4%(125/334)	49.1%(164/334)	11.1%(37/334)	0.9%(3/334)	1.5%(5/334)

*Offered financial incentives other than income
†Desire to work in an underserved areas

SUPPLEMENTARY RESULTS Level of importance factors for decisions to practice in a rural area for women

Women	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)
Limited access to CPD*	28.4%(95/334)	47.3%(158/334)	12.0%(40/334)	9.9%(33/334)	2.4%(8/334)
Long work hours	23.1%(77/334)	40.7%(136/334)	20.4%(68/334)	13.2%(44/334)	2.7%(9/334)
Inadequate supervision	14.1%(47/334)	37.4%(125/334)	21.3%(71/334)	19.5%(65/334)	7.8%(26/334)
Poor working conditions	47.3%(158/334)	41.3%(138/334)	8.4%(28/334)	1.8%(6/334)	1.2%(4/334)
Inadequate income	43.4%(145/334)	46.1%(154/334)	6.9%(23/334)	2.1%(7/334)	1.5%(5/334)
Children's education†	39.5%(132/334)	30.2%(101/334)	9.9%(33/334)	6.6%(22/334)	13.8%(46/334)
Lack of locums	17.7%(59/334)	37.1%(124/334)	28.1%(94/334)	11.1%(37/334)	6.0%(20/334)
Professional isolation	28.7%(96/334)	45.5%(152/334)	15.6%(52/334)	7.2%(24/334)	3.0%(10/334)
Deskilling‡	19.2%(64/334)	35.9%(120/334)	24.9%(83/334)	14.7%(49/334)	5.4%(18/334)
Poor financial incentives	28.1%(94/334)	47.6%(159/334)	16.8%(56/334)	5.4%(18/334)	2.1%(7/334)
Expectations§	24.6%(82/334)	47.0%(157/334)	17.7%(59/334)	7.8%(26/334)	3.0%(10/334)
Desire to do further study	16.8%(56/334)	38.0%(127/334)	23.7%(79/334)	15.9%(53/334)	5.7%(19/334)
Difficulties recruiting staff	14.7%(49/334)	39.8%(133/334)	27.5%(92/334)	12.0%(40/334)	6.0%(20/334)
Heavy work load	20.1%(67/334)	41.0%(137/334)	23.7%(79/334)	12.9%(43/334)	2.4%(8/334)
Issues with colleagues	31.7%(106/334)	37.4%(125/334)	21.3%(71/334)	6.6%(22/334)	3.0%(10/334)
Too many on call duties	12.9%(43/334)	29.6%(99/334)	35.3%(118/334)	14.7%(49/334)	7.5%(25/334)
Job offered elsewhere	21.0%(70/334)	41.3%(138/334)	27.5%(92/334)	6.6%(22/334)	3.6%(12/334)
Lack of community	22.2%(74/334)	44.9%(150/334)	22.5%(75/334)	7.8%(26/334)	2.7%(9/334)
Regulations‖	20.7%(69/334)	37.7%(126/334)	26.6%(89/334)	9.3%(31/334)	5.7%(19/334)
Geographical isolation	26.0%(87/334)	40.7%(136/334)	20.7%(69/334)	9.3%(31/334)	3.3%(11/334)
Personal isolation	34.4%(115/334)	39.8%(133/334)	15.0%(50/334)	7.5%(25/334)	3.3%(11/334)
No employment for partner	46.7%(156/334)	31.1%(104/334)	11.7%(39/334)	5.4%(18/334)	5.1%(17/334)
Professional risk¶	19.5%(65/334)	31.4%(105/334)	29.0%(97/334)	13.8%(46/334)	6.3%(21/334)
Partner career	40.1%(134/334)	38.3%(128/334)	11.4%(38/334)	4.8%(16/334)	5.4%(18/334)

* Limited access to professional development opportunities
† Lack of education opportunities for children
‡ Concern about deskilling
§ Expectations do not meet reality
§ Intent to take on further study
‖ Difficulties with increasing regulations for procedures
¶ Increased professional risk

The full list of the factors associated with level of importance for decisions to practice in a rural area for men is provided in Table 7-6.

Table 7-6: SUPPLEMENTARY RESULTS Factors associated with level of importance for decisions to practice in a rural area for men

Men	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)	RR (95% CI)*	*P value*
Offered high income	13.2%(29/219)	17.1%(51/299)	18.5%(15/81)	27.8%(5/18)	8.3%(1/12)	1.12(1.00, 1.25)	0.053
Financial incentives†	13.5%(18/133)	15.4%(45/293)	19.6%(32/163)	16.7%(4/24)	12.5%(2/16)	1.04(0.97, 1.11)	0.256
Underserved area‡	13.5%(13/96)	16.5%(48/291)	18.9%(35/185)	11.1%(4/36)	4.8%(1/21)	0.97(0.90, 1.03)	0.296
Set up new practice	8.1%(6/74)	15.3%(25/163)	17.5%(31/177)	14.5%(16/110)	21.9%(23/105)	1.06(0.99, 1.12)	0.082
Limited work elsewhere	17.2%(11/64)	17.3%(33/191)	12.6%(28/223)	16.3%(14/86)	23.1%(15/65)	1.02(0.96, 1.08)	0.575
Multidisciplinary team	11%(9/82)	20.3%(48/237)	11.3%(22/194)	15.4%(12/78)	26.3%(10/38)	0.99(0.96, 1.03)	0.762
Enjoyable patients	13.2%(25/189)	18.4%(59/321)	12.6%(11/87)	14.3%(3/21)	27.3%(3/11)	1.09(0.98, 1.20)	0.102
Work experience	18.2%(26/143)	16.1%(42/261)	10.7%(16/149)	19.6%(9/46)	26.7%(8/30)	1.05(0.98, 1.11)	0.154
Widen skills	20.8%(31/149)	16.3%(47/288)	12.2%(17/139)	6.7%(2/30)	17.4%(4/23)	0.92(0.83, 1.03)	0.141
Career development	20%(27/135)	16%(41/256)	14.6%(24/164)	10%(4/40)	14.7%(5/34)	0.97(0.90, 1.05)	0.428
Return to placement	18.4%(7/38)	16.3%(15/92)	13.4%(33/247)	16.5%(17/103)	19.5%(29/149)	0.99(0.96, 1.02)	0.407
Return to hometown	15.6%(10/64)	17.4%(16/92)	11.1%(21/189)	14%(13/93)	21.5%(41/191)	1.00(0.97, 1.03)	0.861
Social networks	14.8%(9/61)	13.1%(23/176)	16.1%(33/205)	18.8%(12/64)	19.5%(24/123)	0.98(0.94, 1.02)	0.309
Extended family	10.6%(9/85)	15.3%(21/137)	16.4%(30/183)	16.5%(13/79)	19.3%(28/145)	1.02(0.98, 1.05)	0.309
Desire to live in region	16.5%(16/97)	16.1%(46/286)	11.7%(18/154)	26.3%(10/38)	20.4%(11/54)	0.95(0.87, 1.02)	0.154
Cost of living	11%(11/100)	12.2%(36/296)	22.9%(35/153)	31.6%(12/38)	16.7%(7/42)	1.04(1.01, 1.08)	0.020
Multicultural area	15.2%(5/33)	13%(15/115)	16.2%(49/302)	20.2%(18/89)	15.6%(14/90)	0.99(0.96, 1.03)	0.755
Good place to raise children	13.1%(20/153)	18.6%(42/226)	15.1%(18/119)	17.4%(8/46)	15.3%(13/85)	1.03(0.95, 1.11)	0.499
Affordable housing	14.5%(17/117)	14.1%(43/304)	19%(27/142)	16.7%(4/24)	23.8%(10/42)	0.96(0.89, 1.04)	0.305
Employment for partner	14.1%(27/191)	18.7%(37/198)	12.3%(16/130)	17.1%(6/35)	20%(15/75)	0.98(0.91, 1.05)	0.557
Desire for rural lifestyle	17.2%(21/122)	17.8%(51/287)	12.7%(19/150)	21.6%(8/37)	6.1%(2/33)	0.92(0.83, 1.02)	0.114
Experience a new place	17.6%(15/85)	16.2%(45/278)	15.3%(31/202)	20%(6/30)	11.8%(4/34)	0.93(0.86, 1.01)	0.068
Teamwork	13.4%(37/276)	18.9%(54/285)	9.4%(5/53)	33.3%(2/6)	33.3%(3/9)	1.02(0.88, 1.17)	0.838
Flexible work hours	11%(22/200)	18.5%(61/330)	16.4%(12/73)	28.6%(4/14)	16.7%(2/12)	1.04(0.94, 1.15)	0.477
Financial incentives	14.8%(33/223)	15.8%(50/317)	20.3%(15/74)	33.3%(2/6)	11.1%(1/9)	1.10(0.99, 1.22)	0.088
Current income suitable	15.6%(38/243)	15.7%(50/319)	19.6%(11/56)	33.3%(2/6)	0%(0/5)	0.99(0.84, 1.17)	0.886
Enjoy rural lifestyle	17%(27/159)	19%(56/294)	8.3%(11/133)	16.7%(4/24)	15.8%3/19)	0.95(0.83, 1.09)	0.470
Sense of belonging in area	17.6%(31/176)	16.7%(55/329)	9.6%(9/94)	21.4%(3/14)	18.8%(3/16)	0.98(0.86, 1.13)	0.817
Feeling valued by community	16.6%(41/247)	16.7%(52/311)	9.1%(5/55)	18.8%(3/16)	18.2%(2/11)	0.98(0.83, 1.16)	0.820
Good working conditions	16.6%(41/247)	16.5%(55/333)	3%(1/33)	25%(1/4)	25%(3/12)	0.99(0.85, 1.16)	0.923
Family is happy in area	14.9%(51/343)	17.3%(39/225)	11.6%(5/43)	50%(3/6)	25%(3/12)	1.10(0.91, 1.33)	0.323
Workplace autonomy	14.4%(29/202)	16.9%(56/332)	14.5%(11/76)	14.3%(1/7)	33.3%(4/12)	1.01(0.89, 1.16)	0.829
Limited access CPD§	18.2%(29/159)	15.4%(43/279)	13.9%(14/101)	16.2%(11/68)	18.2%(4/22)	0.95(0.86, 1.05)	0.343
Long work hours	8.7%(11/126)	15.2%(35/230)	20.3%(35/172)	20%(16/80)	19%(4/21)	1.05(1.00, 1.11)	0.057
Inadequate supervision	11.1%(8/72)	13%(24/184)	17.8%(30/169)	23.6% (29/123)	12.3%(10/81)	1.12(1.00, 1.25)	0.740

Men	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)	RR (95% CI)*	*P value*
Poor working conditions	13.3%(33/249)	16.5%(43/260)	17.1%(13/76)	27.3%(6/22)	27.3%(6/22)	0.99(0.95, 1.03)	0.117
Inadequate income	15.2%(37/244)	15.6%(43/275)	18.2%(12/66)	25.9%(7/27)	11.8%(2/17)	1.08(0.98, 1.19)	0.908
Poor financial incentives	13.2%(21/159)	13.8%(37/268)	18.1%(25/138)	28.6%(10/35)	27.6%(8/29)	0.99(0.88, 1.12)	0.011
Lack of locums	15%(15/100)	12.5%(28/224)	18.2%(35/192)	18.9%(14/74)	23.1%(9/39)	1.08(1.02, 1.14)	0.686
Professional isolation	16%(26/163)	15.6%(40/257)	20%(26/130)	9.8%(5/51)	14.3%(4/28)	0.99(0.92, 1.06)	0.756
Deskilling	17.9%(17/95)	10.6%(21/198)	17.3%(33/191)	17.4%(16/92)	26.4%(14/53)	0.99(0.90, 1.08)	0.598
Expectations‖	12.6%(18/143)	14.6%(38/261)	18.7%(28/150)	23.9%(11/46)	20.7%(6/29)	0.99(0.94, 1.04)	0.960
Desire to do further study	17.5%(18/103)	14.7%(33/224)	15.6%(26/167)	14.6%(12/82)	22.6%(12/53)	1.00(0.93, 1.08)	0.709
Difficulties recruiting staff	12.4%(11/89)	9.8%(25/254)	22.1%(40/181)	22%(13/59)	26.1%(12/46)	0.99(0.93, 1.05)	0.879
Heavy work load	9%(10/111)	15.4%(35/227)	18.3%(35/191)	22.2%(18/81)	15.8%(3/19)	1.00(0.94, 1.07)	0.196
Issues with colleagues	12.1%(20/165)	16.4%(37/226)	17.5%(28/160)	18.2%(8/44)	23.5%(8/34)	1.04(0.98, 1.10)	0.419
Too many on call duties	11.7%(9/77)	13.2%(25/189)	15.9%(36/227)	17.2%(15/87)	32.7%(16/49)	1.03(0.96, 1.10)	0.741
Job offered elsewhere	16.7%(18/108)	15.8%(35/222)	13.7%(30/219)	17.1%(7/41)	28.2%(11/39)	1.01(0.96, 1.07)	0.464
Regulations increase	16.8%(20/119)	14.2%(32/226)	16.4%(29/177)	17.7%(11/62)	20%(9/45)	1.02(0.96, 1.08)	0.595
Geographical isolation	14.5%(24/165)	14%(32/229)	23.2%(33/142)	12.9%(8/62)	12.9%(4/31)	0.98(0.91, 1.06)	0.657
Personal isolation	13.5%(26/193)	15.9%(37/232)	22.9%(27/118)	11.5%(6/52)	14.7%(5/34)	1.02(0.93, 1.12)	0.732
No employment for partner	13.7%(31/227)	18.7%39/209)	15.5%(17/110)	8.1%(3/37)	23.9%(11/46)	1.01(0.94, 1.10)	0.382
Professional risk	14.6%(14/96)	12.3%(21/171)	17.3%(36/208)	17.5%(17/97)	22.8%(13/57)	1.04(0.96, 1.12)	0.996
Partner career	16.2%(33/204)	16.8%(40/238)	15.9%(18/113)	10.3%(3/29)	15.6%(7/45)	1.00(0.95, 1.05)	0.603
Lack of community	13.2%(17/129)	16.5%(42/255)	13.4%(22/164)	22.2%(10/45)	27.8%(10/36)	0.97(0.89, 1.07)	0.754
Children's education	13%(33/253)	19.7%(37/188)	15.6%(12/77)	16.2%(6/37)	17.6%(13/74)	0.99(0.91, 1.07)	0.158

* β (95% CI)=prevalence ratio (95% confidence interval)
† Offered financial incentives other than income
‡ Desire to work in an underserved areas
§ Limited access to professional development opportunities
‖ Expectations do not meet reality

The full list of the factors associated with level of importance for decisions to practice in a rural area for women is provided in Table 7-7.

Table 7-7: SUPPLEMENTARY RESULTS Factors associated with level of importance for decisions to practice in a rural area for women

Women	**Very important %(n/N)**	**Important %(n/N)**	**Neutral %(n/N)**	**Unimportant %(n/N)**	**Not at all important %(n/N)**	**RR (95% CI)***	***P value***
Offered high income	13.2%(29/219)	17.1%(51/299)	18.5%(15/81)	27.8%(5/18)	8.3%(1/12)	1.11(0.98, 1.26)	0.109
Financial incentives†	13.5%(18/133)	15.4%(45/293)	19.6%(32/163)	16.7%(4/24)	12.5%(2/16)	1.03(0.94, 1.13)	0.556
Underserved area‡	13.5%(13/96)	16.5%(48/291)	18.9%(35/185)	11.1%(4/36)	4.8%(1/21)	1.06(0.98, 1.15)	0.150
Set up new practice	8.1%(6/74)	15.3%(25/163)	17.5%(31/177)	14.5%(16/110)	21.9%(23/105)	1.05(1.01, 1.09)	0.020
Limited work elsewhere	17.2%(11/64)	17.3%(33/191)	12.6%(28/223)	16.3%(14/86)	23.1%(15/65)	1.01(0.96, 1.06)	0.625
Multidisciplinary team	11%(9/82)	20.3%(48/237)	11.3%(22/194)	15.4%(12/78)	26.3%(10/38)	1.05(0.97, 1.13)	0.217
Enjoyable patients	13.2%(25/189)	18.4%(59/321)	12.6%(11/87)	14.3%(3/21)	27.3%(3/11)	0.99(0.85, 1.16)	0.903
Work experience	18.2%(26/143)	16.1%(42/261)	10.7%(16/149)	19.6%(9/46)	26.7%(8/30)	0.90(0.79, 1.03)	0.130
Widen skills	20.8%(31/149)	16.3%(47/288)	12.2%(17/139)	6.7%(2/30)	17.4%(4/23)	0.96(0.83, 1.11)	0.590
Career development	20%(27/135)	16%(41/256)	14.6%(24/164)	10%(4/40)	14.7%(5/34)	0.96(0.83, 1.10)	0.556
Return to placement	18.4%(7/38)	16.3%(15/92)	13.4%(33/247)	16.5%(17/103)	19.5%(29/149)	1.01(0.98, 1.05)	0.468
Return to hometown	15.6%(10/64)	17.4%(16/92)	11.1%(21/189)	14%(13/93)	21.5%(41/191)	1.01(0.97, 1.05)	0.741
Social networks	14.8%(9/61)	13.1%(23/176)	16.1%(33/205)	18.8%(12/64)	19.5%(24/123)	1.03(0.99, 1.08)	0.119
Extended family	10.6%(9/85)	15.3%(21/137)	16.4%(30/183)	16.5%(13/79)	19.3%(28/145)	1.05(1.00, 1.10)	0.031
Desire to live in region	16.5%(16/97)	16.1%(46/286)	11.7%(18/154)	26.3%(10/38)	20.4%(11/54)	1.06(0.99, 1.13)	0.085
Cost of living	11%(11/100)	12.2%(36/296)	22.9%(35/153)	31.6%(12/38)	16.7%(7/42)	1.06(0.99, 1.14)	0.083
Multicultural area	15.2%(5/33)	13%(15/115)	16.2%(49/302)	20.2%(18/89)	15.6%(14/90)	1.04(0.99, 1.08)	0.093
Good place to raise children	13.1%(20/153)	18.6%(42/226)	15.1%(18/119)	17.4%(8/46)	15.3%(13/85)	1.04(0.96, 1.11)	0.344
Affordable housing	14.5%(17/117)	14.1%(43/304)	19%(27/142)	16.7%(4/24)	23.8%(10/42)	1.12(1.04, 1.20)	0.003
Employment for partner	14.1%(27/191)	18.7%(37/198)	12.3%(16/130)	17.1%(6/35)	20%(15/75)	1.09(0.99, 1.20)	0.067
Desire for rural lifestyle	17.2%(21/122)	17.8%(51/287)	12.7%(19/150)	21.6%(8/37)	6.1%(2/33)	1.06(0.96, 1.15)	0.242
Experience a new place	17.6%(15/85)	16.2%(45/278)	15.3%(31/202)	20%(6/30)	11.8%(4/34)	1.05(0.98, 1.13)	0.158
Teamwork	13.4%(37/276)	18.9%(54/285)	9.4%(5/53)	33.3%(2/6)	33.3%(3/9)	1.24(1.00, 1.54)	0.051
Flexible work hours	11%(22/200)	18.5%(61/330)	16.4%(12/73)	28.6%(4/14)	16.7%(2/12)	1.25(1.08, 1.44)	0.002
Financial incentives	14.8%(33/223)	15.8%(50/317)	20.3%(15/74)	33.3%(2/6)	11.1%(1/9)	0.92(0.77, 1.11)	0.408
Current income suitable	15.6%(38/243)	15.7%(50/319)	19.6%(11/56)	33.3%(2/6)	0%(0/5)	1.01(0.85, 1.21)	0.882
Enjoy rural lifestyle	17%(27/159)	19%(56/294)	8.3%(11/133)	16.7%(4/24)	15.8%3/19)	0.99(0.89, 1.10)	0.798
Sense of belonging in area	17.6%(31/176)	16.7%(55/329)	9.6%(9/94)	21.4%(3/14)	18.8%(3/16)	0.95(0.82, 1.10)	0.463
Feeling valued by community	16.6%(41/247)	16.7%(52/311)	9.1%(5/55)	18.8%(3/16)	18.2%(2/11)	0.97(0.77, 1.22)	0.776
Good working conditions	16.6%(41/247)	16.5%(55/333)	3%(1/33)	25%(1/4)	25%(3/12)	0.97(0.76, 1.22)	0.785
Family is happy in area	14.9%(51/343)	17.3%(39/225)	11.6%(5/43)	50%(3/6)	25%(3/12)	1.08(0.85, 1.36)	0.544
Workplace autonomy	14.4%(29/202)	16.9%(56/332)	14.5%(11/76)	14.3%(1/7)	33.3%(4/12)	1.10(0.95, 1.27)	0.212
Limited access CPD§	18.2%(29/159)	15.4%(43/279)	13.9%(14/101)	16.2%(11/68)	18.2%(4/22)	1.02(0.91, 1.14)	0.725
Long work hours	8.7%(11/126)	15.2%(35/230)	20.3%(35/172)	20%(16/80)	19%(4/21)	1.10(1.03, 1.18)	0.004

Women	Very important %(n/N)	Important %(n/N)	Neutral %(n/N)	Unimportant %(n/N)	Not at all important %(n/N)	RR (95% CI)*	*P value*
Inadequate supervision	11.1%(8/72)	13%(24/184)	17.8%(30/169)	23.6% (29/123)	12.3%(10/81)	1.07(1.02, 1.11)	0.002
Poor working conditions	13.3%(33/249)	16.5%(43/260)	17.1%(13/76)	27.3%(6/22)	27.3%(6/22)	1.15(0.97, 1.36)	0.111
Inadequate income	15.2%(37/244)	15.6%(43/275)	18.2%(12/66)	25.9%(7/27)	11.8%(2/17)	1.08(0.91, 1.27)	0.372
Poor financial incentives	13.2%(21/159)	13.8%(37/268)	18.1%(25/138)	28.6%(10/35)	27.6%(8/29)	1.02(0.92, 1.13)	0.731
Lack of locums	15%(15/100)	12.5%(28/224)	18.2%(35/192)	18.9%(14/74)	23.1%(9/39)	1.05(1.00, 1.12)	0.068
Professional isolation	16%(26/163)	15.6%(40/257)	20%(26/130)	9.8%(5/51)	14.3%(4/28)	1.02(0.91, 1.15)	0.691
Deskilling	17.9%(17/95)	10.6%(21/198)	17.3%(33/191)	17.4%(16/92)	26.4%(14/53)	1.01(0.94, 1.08)	0.854
Expectations‖	12.6%(18/143)	14.6%(38/261)	18.7%(28/150)	23.9%(11/46)	20.7%(6/29)	1.11(1.03, 1.21)	0.009
Desire to do further study	17.5%(18/103)	14.7%(33/224)	15.6%(26/167)	14.6%(12/82)	22.6%(12/53)	1.00(0.94, 1.06)	0.956
Difficulties recruiting staff	12.4%(11/89)	9.8%(25/254)	22.1%(40/181)	22%(13/59)	26.1%(12/46)	1.07(1.02, 1.13)	0.012
Heavy work load	9%(10/111)	15.4%(35/227)	18.3%(35/191)	22.2%(18/81)	15.8%(3/19)	1.09(1.02, 1.15)	0.006
Issues with colleagues	12.1%(20/165)	16.4%(37/226)	17.5%(28/160)	18.2%(8/44)	23.5%(8/34)	1.10(1.00, 1.22)	0.040
Too many on call duties	11.7%(9/77)	13.2%(25/189)	15.9%(36/227)	17.2%(15/87)	32.7%(16/49)	1.05(1.01, 1.09)	0.027
Job offered elsewhere	16.7%(18/108)	15.8%(35/222)	13.7%(30/219)	17.1%(7/41)	28.2%(11/39)	1.01(0.93, 1.10)	0.802
Regulations increase	16.8%(20/119)	14.2%(32/226)	16.4%(29/177)	17.7%(11/62)	20%(9/45)	1.02(0.95, 1.10)	0.549
Geographical isolation	14.5%(24/165)	14%(32/229)	23.2%(33/142)	12.9%(8/62)	12.9%(4/31)	1.06(0.97, 1.15)	0.182
Personal isolation	13.5%(26/193)	15.9%(37/232)	22.9%(27/118)	11.5%(6/52)	14.7%(5/34)	1.07(0.97, 1.17)	0.173
No employment for partner	13.7%(31/227)	18.7%39/209)	15.5%(17/110)	8.1%(3/37)	23.9%(11/46)	1.05(0.92, 1.19)	0.488
Professional risk	14.6%(14/96)	12.3%(21/171)	17.3%(36/208)	17.5%(17/97)	22.8%(13/57)	1.03(0.96, 1.1)	0.386
Partner career	16.2%(33/204)	16.8%(40/238)	15.9%(18/113)	10.3%(3/29)	15.6%(7/45)	0.98(0.86, 1.11)	0.738
Lack of community	13.2%(17/129)	16.5%(42/255)	13.4%(22/164)	22.2%(10/45)	27.8%(10/36)	1.09(1.02, 1.17)	0.016
Children's education	13%(33/253)	19.7%(37/188)	15.6%(12/77)	16.2%(6/37)	17.6%(13/74)	1.04(0.95, 1.15)	0.393

* (95% CI)=prevalence ratio (95% confidence interval)
† Offered financial incentives other than income
‡ Desire to work in an underserved areas
§ Limited access to professional development opportunities
‖ Expectations do not meet reality

7.3 Postscript

This section has presented the supplementary qualitative and quantitative results of the thesis, therefore finalising the data analysis for this thesis.

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9 IMPROVEMENTS FOR THE DENTAL RELOCATION AND INFRASTRUCTURE SUPPORT SCHEME (DRISS)

9.1 Preface

This section uses the strategic policy incentive knowledge that I have developed from conducting this research, to show how what I have learned is important for an existing Commonwealth rural dental workforce policy. In order to improve financial stability concerns for dental practitioners considering rural practice and consequently improve dental service delivery outcomes for rural populations, the following improvement strategies were recommended for consideration in relation to the Australian Government's already operating Dental Relocation and Infrastructure Support Scheme:

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9.2 The Dental Relocation and Infrastructure Support Scheme (DRISS)

The Dental Relocation and Infrastructure Support Scheme (DRISS) (RHWA 2014, Rural Health Workforce Australia 2015) is a financial grant program designed to help improve access to dental treatment services for rural people, by increasing the dental workforce distribution and improving service delivery in rural areas. It was announced by the Australian Government as part of the 2012-2013 Budget and administered by Rural Health Workforce Australia (RHWA) on behalf of the Department of Health (DoH). As of April 2016, the Australian Government has announced it will provide $57,494 million over three years for DRISS (Department of Health 2016).

There are two components to DRISS:

- Relocation grants of up to $120,000 based upon the dentist's original practice location and their more rural new practice location;

- and infrastructure grants of up to $250,000 to help with equipment purchasing, capital works and refurbishment.

This scheme's key strategic plan was to increase private dental health services for underserved rural populations by increasing the number of dentists in rural areas. A strategy of the scheme was to financially support dentists to relocate by providing them with a grant to build a new practice or expand the services of an existing private practice in an area more rural than that in which they were previously working. DRISS is similar in this regard to other health workforce recruitment strategies (Buykx, Humphreys et al. 2010, Godwin, Hoang et al. 2014). There is, however, little evidence of the long-term sustainability of one-off funding grants, and evidence suggests that financial incentives increase recruitment but not retention in rural areas (Grobler, Marais et al. 2009, Buykx, Humphreys et al. 2010). Research has found that there had to be assurance of long-term financial security before dentists would consider rural practice (Godwin, Hoang et al. 2016).

Strategies that focus on recruitment and not retention are often to the detriment of the long-term stability of the health workforce in rural communities (Silva, Phung et al. 2006). This can result in workforce 'churn', by which we mean the regular turnover of dental practitioners as they move out of rural areas into more urban areas. This churn takes important skills, knowledge, and expertise away from rural areas, and leaves behind a scarcer, more dispersed, more unskilled workforce servicing more disadvantaged populations for which there is greater need for these skills. There are several other issues with DRISS. Eligible applicants must be registered with the Dental Board of Australia as a general dentist. This does not allow for specialists to apply, all of whom provide important dental services. Dentists wishing to apply have to be intending to carry out private practice. Research has shown that private dentists believe that some rural areas in Australia simply do not have a population large enough to sustain their work (Godwin, Hoang et al. 2016). There are also risks associated with using simplified measures of workforce maldistribution in identifying areas of need (Tennant, Kruger et al. 2013). Australian rural areas differ greatly in their cultural, political, social and economic

makeup. There are complex and interrelated factors that can affect the supply of and demand for dental treatment in rural areas. Simply moving to a 'more regional, rural or remote' area than the location of the current practice, without identifying the demand or patient base, is failing the purpose of the scheme. The scheme aims to determine the needs and provide support to rural and remote communities in the establishment and expansion of dental practices (Department of Health 2016) but without actually doing this. Most recruitment strategies are financial in nature (Godwin, Hoang et al. 2014), and DRISS follows this established pattern. The long-term effectiveness of many of the strategies aimed at increasing the rural dental workforce is unable to be measured (Godwin, Hoang et al. 2014).

DRISS seeks to improve access to dental treatment in previously underserved rural areas. This would almost certainly require private practitioners to treat a mixture of public and private patients. This is allowed under the eligibility criteria, and should be encouraged in disadvantaged rural areas. This could address the needs of rural people who cannot afford to seek private dental treatment, but who are unable to travel the long distances required to visit a public clinic.

9.3 Recruitment, retention and turnover

There are many complex reasons for workforce recruitment, retention and turnover. Dental practitioners are often attracted to rural practice by a combination of attractive and sustainable financial returns, lifestyle factors, and the opportunity to establish their own practice (Kruger and Tennant 2005). Incentives that could better address long-term retention would be those focused on offering personal and professional support, consultation and financial incentives for rural retention. There are several approaches that could improve the long-term retention outcomes of DRISS. These include increasing the scope of eligibility for dental specialists and allowing already established rural practitioners to expand their practices by taking on another dentist, and/or more support staff.

There should be a more thorough analysis of the area identified by the practitioner for their new practice. Currently, the only requirement is to move to a more rural area than that of the original practice. Under these guidelines, a practitioner could move only a very short distance, or from

a major city to an inner regional area, where there is not a shortage. The scheme could better address the urban/rural maldistribution issue by requiring moves to outer regional, remote or very remote Australia, with higher financial rewards accompanying those to the most remote locations, and providing retention bonuses to those who remain in these areas for periods of five or more years. Rural retention is also associated with integration into the local community (Veitch and Grant 2004). Consultation with the local community and the new dental practitioner (and importantly their families) can facilitate a sense of belonging and feelings of being valued that can improve retention rates.

Any potential moves into a rural area that already has an existing practice should be conducted in partnership or at least discussion with the local established dentist. It is unfair for a competitor to receive a financial incentive while an existing practitioner in the area has not. Specialists could also be financially incentivised to visit rural areas and work in an established rural practice in partnership with the established practitioner. DRISS could be used to facilitate retirement of existing practitioners. Rural dentists are, on average, older than their city counterparts (Australian Institute of Health and Welfare 2014). They are often sole practitioners owning and operating their own practice. DRISS could be used to allow for the purchase of established rural practices from retiring practitioners.

The eligible practitioner should be required to have a level of experience and clinical skills that enables them to work effectively in the rural area. Rural dental practitioners do not have ready access to specialists, professional help, and referral pathways for a patient presenting with a problem that is beyond their clinical capabilities. They should be capable of handling most emergency treatment alone.

The rural areas practitioners move to under DRISS should be identified as having adequate demand for a dental practice to ensure suitable future income from the local population (Godwin, Hoang et al. 2016). The cessation of the Child Dental Benefits Schedule (Department of Health 2016) as announced in the last Federal Budget may adversely affect the viability of some of the dentists who have moved to rural areas under DRISS. Children previously being seen in rural private practices could no longer be eligible to access the benefits to cover their dental treatment. Policy makers need to understand how one policy may adversely affect other

policies. Establishing that there is a need for dental services in a particular area would decrease workforce churn. There are rural and remote areas in Australia that are in desperate need of dental services, but which simply do not have the local population base to support a private practitioner. For areas such as this, DRISS in its current form cannot help and other service delivery models are needed. Grants for infrastructure for part-time practices, mobile dental clinics, fly-in fly-out services, and tele-dental services could be utilised and paid for under an improved DRISS.

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Opinions expressed in this article are not necessarily those of any of these organisations.

9.4 Postscript

This section used the strategic policy incentive lessons that I learnt from conducting this research, to show how what I have learned is important for improving an existing Commonwealth rural dental workforce policy. This next chapter will sum up the findings from this thesis and how they relate to the existing body of knowledge on the Australian rural dental workforce.

10 SUMMARY AND CONCLUSIONS

10.1 Background and aims of the thesis

The principal aim of this thesis was to better understand the factors that may influence rural recruitment, retention, and turnover in the Australian rural dental workforce, so that the urban/rural maldistribution of the workforce can be addressed and access to dental care services can be improved for rural populations.

10.2 Major findings

The study has achieved its aims to investigate the attitudes of Australian dental practitioners towards living and working in Australian rural areas and to identify the factors that influence the rural recruitment, retention, and turnover of Australian dental practitioners in rural areas given that there is a mal-distribution of the workforce between urban and rural areas. Finally, the research hypothesis investigated whether dental practitioners who themselves have a rural background were more likely to practice in rural areas than those who do not have a rural background, and if so this will be more pronounced for female dental practitioners than for male dental practitioners.

10.2.1 Views of Australian dental practitioners towards rural recruitment and retention

- (RQ1) What are the attitudes of Australian dental practitioners towards living and working in Australian rural areas?

The opinions of Australian dental practitioners towards rural practice were analysed using thematic analysis and four themes were identified: Business case (concerns related to income and employment), Differences in clinical practice (differences in clinical procedures and professional work between urban and rural practice), Community (fitting in and belonging in the area in which you live and work), and Individual factors (local area provision and personal preferences for lifestyle choice and circumstance). The most important factor and common primary consideration for rural recruitment decisions for dental practitioners was financial sustainability. This factor, unlike the other influential factors was unable to be compromised or

substituted. Private dental practitioners were unwilling to work in Australian rural areas that do not have large enough populations to provide a sustainable income. Community and Individual factors were also important for rural recruitment and retention, and PRE, RBE, social bonds to the local community, and enjoyment of the rural lifestyle were highly influential. Rural lifestyle enjoyment was comprised of provision for the family, education for children, and employment for partner/spouse. Preferences for clinical procedures could also influence workplace decisions, as there were differences in clinical practice between urban and rural practice.

10.2.2 Factors influencing Australian dental practitioners' decisions on rural practice recruitment, retention, and turnover

- (RQ2) What are the factors that influence the rural recruitment, retention, and turnover of Australian dental practitioners?

Using quantitative multivariable analysis (Ordinal log multinomial regression using a forwards-descending adjacent categories model), this study identified that rural workforce participation was associated with two attitudinal factors for men, and 12 for women. Male rural practitioners were more likely than their urban colleagues to consider poor financial incentives other than income to be of increased importance, and cost of living; to be of lesser importance. Female rural practitioners were more likely than their urban counterparts to consider work structure factors: setting up a new practice, flexible work, long work hours, heavy workloads and too many on call duties; workplace relations factors: inadequate supervision, difficulties recruiting staff, and issues with colleagues; lifestyle factors: lack of community, being close to extended family, and expectations failing to meet reality; and financial issues: affordable housing; to be of lesser importance. These findings indicated that rural dental practitioners were less concerned with negatively described rural practice factors of increased workload, dissatisfaction with rural lifestyle, and inability to successfully integrate into the rural community than their urban colleagues were.

10.2.3 The effect of rural background on rural practice in Australian dental practitioners

- (H1) (a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so

this will be more pronounced for female dental practitioners than for male dental practitioners.

Using quantitative multivariable analysis utilising Poisson regression with robust standard errors, this was the first study from Australia to determine that rural background was positively associated with rural practice for women, but not for men. There were two other significant interactions between female dental practitioner demographic characteristics and rural practice; attending a rural dental school, and participating in a rural clinical placement program that increased the likelihood of rural practice. The statistically significant factors that increased the likelihood of rural practice were all PRE factors previously identified in this thesis: rural background, attending a rural dental school, and participating in a rural clinical placement program. There was one statistically significant work type factor; working in a private practice, that reduced the likelihood of rural practice. This finding supports the previous qualitative research paper finding that private practitioners were unwilling to work in rural areas if the area's population size was unable to support them financially.

10.3 Significance of the study

The first strength of the study is that it is the first nation-wide study in Australia investigating the opinions and attitudes of Australian dental practitioners towards working and living in rural areas. This is especially important due to the ongoing barriers to access rural populations face in accessing readily available dental treatment because of the urban/rural workforce maldistribution. This thesis was the first in Australia to test assumptions from the rural medical workforce research on the influences of rural background on the drivers of work location choice in the rural dental practitioner workforce. Another strength of the study was the use of the mixed methods design to enhance the data collection and data analysis to achieve a richer insight to interpret and understand the attitudes and opinions of Australian dental practitioners towards rural practice. Using this study design, we identified the major economic barrier to dental practitioners working in rural practice, the long-term sustainability of rural practices due to smaller population sizes and lower comparative visitation patterns than urban areas; and the major individual predictor of rural practice, rural background.

10.3.1 Contextual significance

This study makes an important contribution to the rural Australian dental workforce as it identifies that there are some important structural barriers towards working in rural private practice, which are not easily overcome, that prior exposure to rural areas was highly influential to rural retention, and that the rural background effect is evident in the Australian dental practitioner workforce. This research provides significant new insight into the factors that influence dental practitioners' rural practice workforce decisions, which is important for policy makers, universities, the dental health industry, and rural communities. This study provides a better understanding of the attitudes of dental practitioners towards rural practice, and the key factors that influence rural work movement decisions. This knowledge can provide state and federal government policy makers with a better understanding of the needs of dental practitioners to increase retention, improve service delivery, and enhance provision of dental care services in rural areas. Additionally, the strategic policy incentives knowledge that was developed from conducting this research, demonstrated this by providing improvements for an existing Commonwealth rural dental workforce scheme.

This study benefits federal and state Governments by providing them with information about the detrimental effects of financial recruitment incentives on rural retention rates, and that the most influential long-term retention factors for rural practice were personal, and unable to be addressed financially. Additionally, due to a range of complex reasons, there are some rural areas in Australia that are unable to support a full-time private dental practitioner, and in these areas, other health service delivery models need to be developed specific to the needs of the area.

This study benefits universities with a dental school in that it provides them with information about the influence of prior rural exposure on rural practice for dental practitioners. This knowledge will allow universities to address rural recruitment and retention of dental practitioners by increasing the proportion of women with a rural background, promoting experience of rural practice during undergraduate training through rural clinical placements, rural work experience, and community integration.

This study also provides insightful information about the views of the rural dental practitioner workforce. This was done by identifying that the most important factors influencing rural retention were individual factors. Additionally, by discovering that the key barrier to rural practice recruitment was that some rural areas were unable to provide an appropriate level of income for a private rural dental practice; and that only sound business investments would be developed in the private sector in rural areas. Furthermore, that currently working female rural dental practitioners were less concerned with previously negatively described rural practice factors. These findings help to raise awareness of the attitudes of dental practitioners towards working in rural areas, when the attitudes of dental practitioners are understood, the barriers are better able to be addressed and the influential factors able to be strengthened.

Finally, this study provides a significant contribution to the body of knowledge about the attitudes of dental practitioners towards working and living in Australian rural areas because it was the first Australian-wide study covering all dental practitioner types from both urban and rural areas.

10.3.2 Theoretical significance

This study contributes to the body of knowledge on the Australian rural dental practitioner workforce in a number of ways. Firstly, it contributes though the methodological perspective. Prior to this thesis, there was little comprehensive or definitive research into the influences on the work movement decisions of Australian dental practitioners using a mixed methods approach. This study employed this approach to investigate dental practitioners' attitudes towards rural practice, the factors that influence rural practice, and whether there was evidence of the rural background effect. The interviews successfully identified the personal opinions and attitudes, barriers, and enablers of Australian dental practitioners towards rural practice. The surveys helped to validate, strengthen, and confirm these results, by identifying the attitudinal factors that were associated with rural workforce participation, and determining that rural background was positively associated with rural practice for women, but not for men. The data were strengthened by incorporating both urban and rural practitioners in the interviews and surveys. The combined findings provide an important contribution to the body of knowledge on the Australian rural dental practitioner workforce, by identifying a comprehensive list of

barriers and influential factors. The methodology used in this study can be applied in future studies investigating the attitudes of other health practitioners.

Finally, the study makes a timely contribution to the body of knowledge on the Australian rural dental practitioner workforce. This knowledge is crucial for future workforce planning regarding urban/rural maldistribution because of the current oversupply of the dental practitioner workforce. While, it could be suggested that the increased dental workforce numbers would mean all Australians could soon have ample access to dental treatment. There is evidence that increasing the workforce may only solve short-term problems with recruitment because long-term retention should be the focus of policy initiatives. There are several studies that point out that rural health workforce issues could be best addressed by retention focused policy rather than recruitment, and that there are different factors influencing each (Buykx, Humphreys et al. 2010). This is the first Australia-wide study to focus on the rural workforce maldistribution issue specific to Australian dental practitioners.

This study demonstrates that there are more complex factors such as lifestyle and family concerns that can influence rural retention. These factors could not be easily manipulated by a government body or policy incentive scheme.

10.4 Implications of the findings

This study has, for the first time in Australia, investigated the attitudes of dental practitioners towards rural practice, described the key factors that influence rural recruitment, retention, and turnover, and found evidence of the rural background effect in Australian female dental practitioners. Implications specific to each research question are as follows.

10.4.1 Research question 1

What are the attitudes of Australian dental practitioners towards living and working in Australian rural areas?

1. Although some private dental practitioners identified a business opportunity in rural practice and happily worked there. They were unwilling to work in areas that were unable to provide sufficient local demand to maintain a sustainable income. Because of this, some rural areas are unable to support a private dental practitioner, in these areas,

needs-specific health service delivery models should be developed to match local area need.

2. Previous experience of rural areas increased the likelihood of rural practice, because it developed an increased enjoyment of 'rural lifestyle'. Rural lifestyle enjoyment was comprised of individual factors such as: provision for family, education for children, and employment for partner/spouse. Social integration of the dental practitioner and their family increased the likelihood of rural retention; this enabled them to engage with the community, develop social bonds, and participate in local social activities.

3. Individuals with a rural background were more likely to work in rural practice as they enjoyed the rural lifestyle, had pre-existing social bonds, and could integrate into the local rural community. Rural background individuals should be encouraged to undertake dental degrees.

4. Dental practitioners who did not have prior rural experience were fearful of rural areas and displayed uncertainty towards working in rural communities because they were unfamiliar with the rural lifestyle. Rural clinical experience during undergraduate training could be used to enable rural exposure for dental students.

10.4.2 Research Question 2

What are the factors that influence the rural recruitment, retention, and turnover of Australian dental practitioners?

1. Female rural dental practitioners were less concerned with work structures, workplace relations, lifestyle, and financial issues than their urban colleagues were. This may mean that female rural dental practitioners were either able to access these work and lifestyle arrangements and were satisfied with their situation, or that they were not able to access them and were unconcerned with the arrangements.

2. Rural male dental practitioners were more likely to consider poor financial incentives other than income to be of greater importance than male urban dental practitioners were. Financial rural recruitment incentives are effective at increasing recruitment, but not retention (Silva, Phung et al. 2006, Buykx, Humphreys et al. 2010). The finding implies

that male rural dental practitioners could be encouraged to remain in rural areas with financial incentives, such as a retention bonus.

10.4.3 Hypothesis 1

(a) Dental practitioners who themselves have a rural background are more likely to practice in rural areas than those who do not have a rural background, and (b) if so this will be more pronounced for female dental practitioners than for male dental practitioners.

1. Female dental practitioners who had an Australian rural background were more than twice as likely as those who had an urban background to work in rural practice. The implicit reasons why rural background was such a strong predictor for rural practice remain unknown. The reasons that have been suggested were that individuals with rural backgrounds could possess an increased ability to socialise and acculturate to the rural environment and they have pre-existing local social support networks.

2. Male and female dental practitioners who graduated from a rural dental school were more likely to work in rural practice as those graduates of Australian urban dental schools. This supports the evidence for the increased likelihood of rural practice after rural exposure during undergraduate training. The results indicate that training in rural locations to increase rural exposure for dental practitioners should be encouraged.

3. Female respondents who had participated in rural clinical placement programs during undergraduate training were also more likely to work in rural areas than those who had not. This implied that there was an increased likelihood of rural practice after rural clinical experience during undergraduate training, for women, but not for men. The reasons why rural clinical placement was associated with rural practice for women, but not for men were untested in this study. However, the results point to a need to encourage rural training experience for all dental practitioners.

4. Privately employed female dental practitioners were less likely to work in rural areas than those in other types of employment. This supports the previous finding that dental practitioners were unwilling to work in areas that were unable to provide sufficient local

demand to maintain a sustainable income. This strengthens the argument for the development of differing and needs-specific service delivery models for rural areas unable to support a private dental practice.

10.5 Recommendations from the study findings

There are several recommendations from the study findings for future improvements to increase the recruitment and retention, and to decrease the turnover of the rural dental practitioner workforce, and improve access to dental treatment services for rural communities. There are also several recommendations based upon participant responses and the opinions of the researcher.

10.5.1 Government level

1. The focus should be on the long-term retention, rather than the short-term recruitment of dental practitioners. This could be facilitated by reducing financial recruitment incentives because they were suggested to increase turnover. The most influential long-term retention factors for rural practice were personal, this could include assistance with social and community integration for new dental practitioners.

2. In rural areas unable to support a private dental practice, the Australian Government should work in collaboration with the local community to develop needs-specific service delivery models and plan oral health treatment services to meet the oral health needs of individual rural areas.

10.5.2 University level

1. Increase the proportion of women with a rural background in all Australian dental schools to increase rural retention.

2. Increase the proportion of geographically diverse rural background dental students (male and female) in all Australian dental schools to increase rural retention.

3. Rural dental practitioners should be specially trained to have a broader scope of practice because there are often no specialists nearby and they often treat emergency patients. Existing rural dentists have had to develop these skills without help. Universities and CPD providers could be encouraged to develop programs specifically for rural dental practitioners so they can undertake a broader scope of clinical procedures at a subspecialist level to increase rural recruitment and retention.

4. Government regulation of university enrolment caps/targets to reflect labour market demand to address oversupply concerns.

5. Increased promotion and exposure to rural practice during undergraduate training through rural clinical placements, rural work experience, and community integration to increase rural recruitment and retention.

6. In very isolated and remote areas, where a fixed private dental practice is not financially viable due to low population, physicians, nurses, Aboriginal health workers and pharmacists could be trained to provide dental screening and to understand which oral conditions require urgent dentist or dental specialist referral, which can be treated by antibiotics, and which can be treated via minimally invasive dental techniques that they can be taught to perform.

10.5.3 Community level

1. Dental care services need to reflect community need. A community centred approach to recruitment could also be used for rural areas that have suffered historically high workforce turnover to address local demand and need.

2. Improvement and encouragement of rural professional support networks to provide mentoring and supervision for newer graduates. The professional dental associations and CPD providers could have an important role to play in building these networks. Using methods such as phone help services, online help, tele-dental and e-dental services, and electronic network communities.

10.5.4 Recommendations based upon participant responses and researcher opinion

1. Fluoridation of reticulated water supplies. It is the most effective and socially equitable means of improving oral health outcomes for the Australian population. The responsibility for water fluoridation should be made at the state and federal levels, not though the local government, and all communities with populations larger than 1000 people should have access to water fluoridation. Any Government money budgeted for dental services in rural areas, should be on the condition of the area having fluoridation of their reticulated water supplies.

2. Expansion of the Dental Infrastructure Support Scheme (DRISS) to include dental specialists, existing rural dentists (to expand their existing dental practices) and new practitioners (to buy and expand existing rural practices), a greater consideration to the long term viability of new practices and their effect on existing practices, and to include assistance with social and community integration for new practitioners to facilitate retention rather than recruitment.

3. Increased financial and tax incentives for dental health practitioners in rural areas, especially for travel, accessing continuing professional development (CPD), retention bonuses, and staying away from home allowances to increase rural recruitment and retention.

4. Tax incentives for rural practitioners to help with increased professional isolation, equipment maintenance, and staffing to increase rural recruitment and retention.

5. Higher government salary remuneration and retention bonuses in rural areas for public practitioners to increase rural recruitment and retention.

6. Support for innovative private dental practice in small rural areas, such as practices enabled to treat a mix of private and public patients, funded by the Australian Government, and financial incentives for private practitioners to treat public sector patients to increase rural recruitment and retention.

7. Housing provision for appropriate dental practitioners in isolated rural areas to increase rural recruitment and retention.

8. Debt relief for new graduates' Higher Education Loan Programme (HELP) and Higher Education Contribution Scheme (HECS) student debts for those willing to undertake contractual work in rural areas directly after graduation, to increase rural recruitment.

9. Encourage short-term rural contract work for all new graduates under the supervision/mentorship of senior rural clinicians.

10. Make rural clinical placements compulsory for all dental students and diversify and increase their length: more than one and in different rural areas. This would provide students with experiences in more rural areas, so that comparisons can be made, rather than just one experience of just one program in one rural area. Given that Australian rural areas are so vast and geographically different, providing exposure to several different rural areas could be beneficial to increase rural recruitment and retention.

10.6 Study limitations

This thesis also has several limitations. In regard to the qualitative portion of the study, the limitations were due to the nature of volunteer participants, there was a higher than average proportion of rurally experienced dental practitioners participating in the interviews. The use of snowball sampling could introduce bias as individuals who know each other could share similar characteristics and opinions. There were a higher number of dentists compared with OHT's and prosthetists, which could mean that factors that were influential for dentists in comparison to other dental practitioners may have been overly addressed.

There were also limitations to the quantitative section of the study: one was that the sample size was small relative to the number of dental practitioners in Australia. It was however, sufficient to provide adequate power for the intended analyses. The sampling frame covered over 60% of the study population and it was limited to members of professional dental associations with current email addresses due to privacy concerns. The low response proportion was a further limitation, as we cannot discount the possibility that non-responders were differentially

influenced in their decision to practice or not to practice in a rural location by the factors identified as having influenced the respondents. Finally, the cross-sectional study design does not support attrition of causation in the associations identified.

10.7 Recommendations for future research

During the course of this study, numerous gaps in research were identified. It is recommended that the following areas be considered for future research.

1. This study identified that there was little known on the long-term retention factors for Australian dental practitioners in rural areas. Such knowledge is required to better understand of the determinants of workforce choice for dental practitioners. This may enhance service delivery through the provision of a more stable and accessible workforce. Therefore, a study into the factors that influence long-term retention is recommended.

2. This study had a low response proportion; further study could have a larger sample size of all Australian registered dental practitioners, and consist of a longitudinal study following the practice location movements of dental practitioners from graduation onwards, including their rural background status (locations of pre-school, primary, and high school), their dental school, and rural clinical placement participation record.

3. Further study to strengthen the knowledge on prior rural exposure and rural background and rural practice in dental practitioners.

4. The literature review conducted at the beginning of this study identified that there were no studies addressing the urban/rural workforce distribution of dental prosthetists. Therefore, research specifically focused on Australian dental prosthetists is recommended.

5. This study combined the findings from differing dental practitioner workforce divisions, future research could focus on the determinants of workforce choice for dental practitioners specific to their individual divisions. Therefore, a study into the factors that influence rural practice specifically for dentists, dental specialists, dental

prosthetists, dental hygienists, dental therapists, and oral health therapists as separate groups is recommended.

6. The findings from this study indicate that rural clinical placement was an influential factor increasing the likelihood of rural practice. Due to the low response proportion in this study, and the fact that rural clinical placements were only offered to undergraduate students since the year 2000, power calculations were not feasible to test the effect of rural clinical placement on rural practice because too few of the dental practitioners had had a rural training placement experience. Therefore, future research could be conducted into the effects of rural clinical placement programs during undergraduate training on the short-term and long-term practice location decisions of Australian dental practitioners to determine if those who were exposed to a rural clinical placement were more likely to (a) be recruited into rural practice directly after graduation and (b) be retained in rural practice longer than five years, than those who had not participated in a rural clinical placement program.

7. Additionally, the findings from the qualitative phase of this study indicated that partner employment concerns were an important factor for women and could act as either a barrier, or an enabler to rural practice. The low response proportion prevented power calculations from being feasible to test the effect of partner employment on rural practice. Research into the influence of partner employment opportunities for Australian dental practitioners to determine (a) if dental practitioners were influenced in their choice of location by their partners' employment opportunities, and (b) this was more pronounced for females than for males is recommended.

10.8 Conclusions

This research is the first national study in Australia investigating the opinions and attitudes of Australian dental practitioners towards working and living in rural areas. This thesis adds to the body of knowledge of the barriers and enablers of rural practice for Australian dental practitioners by providing a comprehensive view of the positive and negative factors that can influence rural recruitment, retention, and turnover, and it was the first study from Australia to

determine that rural background was positively associated with rural practice for women, but not for men. This study has made a significant and timely contribution to the body of knowledge of the Australian rural dental practitioner workforce because there has been an increase in the number of dental practitioners in Australia in recent years, but with the majority working in urban areas and shortages in rural areas. Arguably, rural areas are the areas in greatest need of dental health care services for a number of reasons. The study has provided a list of recommendations to help policy makers, universities, and rural communities address these workforce issues. The findings also highlight areas that require further research in this field. The published studies included in this thesis provide the beginnings of an evidence base for the predictors, enablers and barriers for Australian registered dental practitioners towards living and working in rural areas. Finally, it is concluded that the most important factors influencing rural retention were individual factors and that the key barrier to rural practice recruitment was that some rural areas were unable to provide an appropriate level of income for a private rural dental practice.

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12 APPENDIX

Appendix A. **Supplementary systematic literature review**

i. Introduction

This section provides an overview of an updated literature search for all new studies, given that the previous review was completed in 2013. The methods used were the same as those used in the previous review. The updated review was able to identify eight new studies related to recruitment and retention of the rural dental workforce.

ii. Results

Consistent with earlier review, this review found limited comprehensive literature fitting the selection criteria. This review identified a number of new studies related to the recruitment, retention, and turnover of dental practitioners in rural areas. The initial pool considered of 445 papers, eight articles met the inclusion criteria. An overview of the updated findings are shown in Table 1-11. Six studies were conducted in Australia, one in the USA, and one was an updated Cochrane Review of one of the articles included in the previous review. Four articles were retrospective studies using historic workforce or registration data, one was a literature review, one was a discussion paper, two were qualitative analysis, and one was an opinion piece. Eight studies focused on dentists (McKernan, Kuthy et al. 2013, Crocombe, Bell et al. 2014), dentists and other dental practitioner types (Crocombe, Slack-Smith et al. 2014, Grobler, Marais et al. 2015), dental graduates (Johnson and Blinkhorn 2013), dental practitioners and non-dental primary care providers(Barnett, Hoang et al. 2015), and private dental practices(Tennant, Kruger et al. 2013, Tennant and Kruger 2014). One study was a follow up article, using updated workforce information (Johnson and Blinkhorn 2013). There were no studies that addressed dental prosthetists/technician's urban/rural workforce distribution. Australian research were the most numerous.

iii. Changes in the dental workforce

Two articles identified the changing makeup of the dental workforce. The number of dental practitioners was increasing(Crocombe, Slack-Smith et al. 2014), there was an increasing

proportion of younger dental practitioners(Crocombe, Slack-Smith et al. 2014), and there is an increasing proportion of women in the dental workforce (McKernan, Kuthy et al. 2013, Crocombe, Slack-Smith et al. 2014). Two articles urged policy makers to monitor changing trends in the rural workforce (McKernan, Kuthy et al. 2013, Crocombe, Slack-Smith et al. 2014).

iv. Prior rural exposure

Prior rural exposure was again a common theme in the literature, with two studies mentioning that birthplace was associated with practice location (Johnson and Blinkhorn 2013, McKernan, Kuthy et al. 2013). One Australian study investigated the effect of participating in a rural clinical placement on job location for new graduates, found that students who participated in a rural clinical placement were more likely to work in rural practice than those who did not (Johnson and Blinkhorn 2013).

v. Strategies and incentives

Five articles investigated strategies aimed at the rural dental practitioner workforce. The international strategies were financial in their nature (Grobler, Marais et al. 2015), the Australian strategies included the development of an advanced rural dentist program for dental practitioners (Crocombe, Bell et al. 2014), changes to training programs to reflect the needs of rural populations (Johnson and Blinkhorn 2013, Barnett, Hoang et al. 2015), use of non-dental primary care providers (Barnett, Hoang et al. 2015), modified delivery models (Tennant, Kruger et al. 2013, Crocombe, Slack-Smith et al. 2014), visiting services (Tennant and Kruger 2014), increased use of technology(Tennant, Kruger et al. 2013), increased scope of practice (Tennant, Kruger et al. 2013, Crocombe, Slack-Smith et al. 2014), and improved communication and referral pathways (Barnett, Hoang et al. 2015).

vi. Discussion

The main finding of this updated review was that despite the concerns regarding access to dental care for many rural populations, there remained little comprehensive research into the influences on the rural work decisions made by dental practitioners. The review found that the

studies that fit the review criteria to be unable to measure the long-term effectiveness (Johnson and Blinkhorn 2013) of any of the interventions, or provide strong enough evidence to determine a relationship between incentive and outcome (Grobler, Marais et al. 2015).

vii. Conclusions

This updated review identified eight new studies related to the maldistribution of the dental practitioner workforce between metropolitan and rural areas.

Table 12-1 APPENDIX A: Factors and strategies associated with recruitment and retention of dental practitioners in rural and remote areas updated literature search

Author and year	Country	Objectives	Methods	Subjects	Practitioners	Outcomes
Grobler L, Marais BJ, Mabunda S. 2015	International	Updated review assessed the effectiveness of interventions to increase recruitment and retention of the rural health workforce	Cochrane Review	One article fit the selection criteria	Dentists, Other health disciplines	There was one article which supported interventions aimed to increase the dental practitioner workforce which were free of bias.
Barnett T, Hoang H, Stuart J, Crocombe L. 2015	Australia	Challenges of providing oral health advice/treatment as experienced by non-dental primary care providers	Qualitative study and thematic analysis	39 practitioners	Oral health practitioners	Strategies to improve the provision of dental services by either visiting or resident dental practitioners should include scope to provide community-based oral health promotion activities, and to engage more closely with other primary care service providers in these small communities.
Crocombe LA, Bell E, Barnett T 2014	Australia	Discussion of the development of an advanced rural dentist program	Opinion	Opinion	Dentists	Rural dentists may not feel threatened by change in the clinical practice environment if such change improved patient care and oral health outcomes
Crocombe L, Slack-Smith L, Bell E, Barnett T 2014	Australia	Investigation into optimal management of oral health delivery systems	Discussion paper		Dental practitioners	The oral workforce is going through change in practitioner number, type and possibly attitudes, thereby giving an opportunity to modify its delivery systems.
McKernan SC, Kuthy RA, Kavand G 2013	USA	To examine whether there are differences in rural location based on	Historical Data	1,106	General dentists in Iowa	The dentist workforce in rural areas of Iowa is dominated by older males who were born in Iowa.

		individual characteristics				
Tennant M, Kruger E 2014	Australia	Testing the dental practice to population data at a national level	Historical data	6,901	Private dental practices	Australia has to look to other methods of achieving equity in access to good oralhealth.
Tennant M, Kruger E, Shiyha J 2013	Australia	Examined practice-to-population (PtP) ratios as a measure of accessibility.	Historical data	3545	Private dental practices	PtP ratios in the context of workforce mal-distribution and geographic impediments to access is an important measure.
Johnson G, Blinkhorn A 2013	Australia	Location of recent graduates who undertook a rural clinical placement to determine whether it influenced their choice of job location.	Registration data	75	Graduates	A higher proportion of graduates who participated in the rural placement programme were working in a rural location.

Appendix B. **Invitation letter to third parties (dental professional groups)**

University of Tasmania

Private Bag 103, Hobart, Tasmania,
Australia, 7001

Dear _____

Researchers from the Centre of Research Excellence in Primary Oral Health Care based at the University of Tasmania, Department of Rural Health (Dr Leonard Crocombe, A/Prof Erica Bell, Dr Ha Hoang and Mrs Diana Godwin) are undertaking a research project entitled "Dental Practitioners: Rural Work Movements".

As well as gaining insights into working in rural and remote locations of Australia, this study aims to improve the social well-being of rural dental practitioners and to improve access to dental care for people in rural communities. The project will provide recommendations for policy makers and stakeholders on dental workforce recruitment and retention strategies.

We seek the support of the [Name of the organisation] in three ways:

First, we ask to be able to place an advertisement on your website and in your newsletter to help us recruit telephone interview participants. Included with this letter is the advertisement that invites potential interview participants to contact the investigator. Interview schedules will then be arranged with the volunteer participants. The results of the interviews will be used to help design the survey questionnaire.

After the telephone interviews are completed, we ask you to liaise with our independent researcher (whose only role in the research project will be to assist with stratification of the survey and with the follow up of non-respondents) for the purpose of mailing out the survey.

Finally, we ask that you give a letter of support of the research project to be included with the survey questionnaire. The questionnaires will be made available for you in stamped addressed

envelopes to distribute to your members. Within the stamped addressed envelopes, there will be reply-paid envelopes will be provided for the return of survey questionnaire.

The study has gained ethics approval from the Tasmanian Social Sciences Human Research Ethics Committee. Participation in this study is voluntary and information provided by the respondents will remain confidential and will only be reported in an aggregate format.

Please contact us if you have any queries, concerns or suggestions by either emailing on diana.godwin@utas.edu.au or phoning Diana on (03) 6226 7798.

Yours sincerely

Mrs Diana Godwin

Appendix C. **Advertisement for print media**

UTAS
FACULTY OF HEALTH SCIENCE
Department of Rural Health

(Attachment 2: Advertisement)

DENTAL PRACTITIONERS: RURAL WORK MOVEMENTS

YOUR INPUT IS NEEDED!

Have you ever wondered why dental practitioners move to or away from rural areas in Australia? What influences their decisions on rural work movements? If you are a dental practitioner or dental student, we need your help to answer these questions whether you practice in a rural area or not!

A team of researchers from the Centre of Research Excellence in Primary Oral health Care based at the University of Tasmania, Department of Rural Health is conducting a study on the attitudes, barriers and enablers of Australian dental practitioners towards living and working in rural areas. Findings from the study will provide implications and recommendations for policy makers and other stakeholders regarding recruitment and retention strategies and policies for the Australian rural dental workforce.

You are warmly invited to participate in a 20-30 minute phone interview. Your identity will be strictly confidential and any information you supply will not identify you as a participant.

If you are interested in participating or would like to find out more information, please contact Diana Godwin via email at Diana.Godwin@utas.edu.au or phone 03 6226 7798.

THANK YOU FOR BEING INTERESTED IN OUR STUDY!

Appendix D. **Information sheet for interview participants**

University of Tasmania

Private Bag 103, Hobart, Tasmania,
Australia, 7001

Information Sheet for Interview participants

Dental Practitioners: Rural Work Movements

You are invited to participate in a research study into the attitudes of dental practitioners towards living and working in rural areas of Australia.

This study is being conducted by the Centre of Research Excellence in Primary Oral Health Care based at the University of Tasmania, Department of Rural Health by Dr Len Crocombe, A/Prof Erica Bell, Dr Ha Hoang, and Mrs Diana Godwin.

What is the purpose of this study?

It aims to discover the attitudes of Australian dental practitioners towards living and working in rural areas. The study will provide recommendations for policy makers and other stakeholders regarding recruitment and retention strategies for the Australian rural dental workforce.

Why have you been invited to participate?

You have been invited to participate in this study because you are an Australian-registered dental practitioner. Your input is vital.

What does this study involve?

You will be contacted by email or telephone to arrange an appropriate time and date to undertake a 20-30 minute telephone interview.

You will be provided with an outline of the questions prior to the interview.

At the start of the interview we will seek your permission to audio-record the interview (you may decline permission).

You will be asked questions relating to your experiences and/or views of living and working in rural areas.

You are able to withdraw from the study, and withdraw your data, at any time within twenty eight [28] days of the interview.

All interview data used in this study will be kept in a locked and secure filing cabinet and on password protected computers in the University of Tasmania, Department of Rural Health. The data will be destroyed five [5] years after completion of the study.

Possible benefits from participation in this study?

This study will:

Influence future government policies and initiatives relating to increasing the number of dental professionals working in underserved rural areas in Australia;

Improve dental school and university student placements and incentives to encourage dental professionals and students to work in and remain working in rural and remote areas after graduation;

Address perceived issues related to social isolation and community involvement; and

Improve access to dental care for rural and remote areas.

Possible risks from participation in this study?

The study is designed to explore your views/attitudes towards and/or experiences of working and living in rural areas. It is unlikely that the study will recall painful memories as it is a broad study of workforce issues. However, this is always a minor risk when recalling any experience. Your participation in the study will help achieve many benefits as outlined above.

Anonymity and Confidentiality

Participation in this study is voluntary and any research data gathered during this study will be kept confidential. Any information you supply will not identify you as a participant.

How will the results of the study be published?

This research project is being conducted in partial fulfilment of a PhD for Diana Godwin and is being supervised by A/Prof Bell, Dr Crocombe and Dr Hoang from the University Department of Rural Health at the University of Tasmania. The research will be published in a PhD thesis, in conferences and in peer-reviewed journals and will be available through the University of Tasmania, Department of Rural Health.

What if I have questions about this study?

If you would like to discuss any aspect of this study please feel free to contact Mrs Diana Godwin via email diana.godwin@utas.edu.au or phone (03) 6226 7798.

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee (HREC). If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number [Hxxxxx].

If you agree to participate, please sign the attached consent form and return it to us in the stamped and addressed envelope provided.

Thank you for taking the time to consider this study. You may keep this information sheet.

Appendix E. **Consent forms for interview participants**

University of Tasmania

Private Bag 103, Hobart, Tasmania,
Australia, 7001

FACULTY OF HEALTH SCIENCE
Department of Rural Health

Consent Form for Interview Participants

Title of Study: Dental Practitioners: Rural Work Movements

I agree to take part in the research study named above.

I have read and understood the information sheet for this study.

The nature and possible effects of the study have been explained to me.

I understand that the study involves exploring my experiences and/or views of living and working in rural areas.

I understand that I will participate in an interview of 20-30 minutes which will seek information relating to my experiences/views of living and working in rural areas.

I understand that the interview will be audio recorded with my permission.

I understand that all research data will be securely stored on the University of Tasmania's premises for five [5] years from the publication of the study, and will then be destroyed.

Any questions that I have asked have been answered to my satisfaction.

I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.

I understand that the results of the study will be published provided that I cannot be identified as a participant.

I understand that my participation is voluntary and that I may withdraw within twenty eight [28] days of the interview.

Your name: _____

Your signature: _____

Phone number: _____ Email: _____

Date: _____

Statement by Investigator

I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

The participant has received the information sheet where my details have been provided so participants have had the opportunity to contact me prior to consenting to participate in this project.

Investigator's name: _____

Investigator's signature: _____

Date: _____

Appendix F. **Final interview questions**

Why did you choose the geographical area in which you work?

Why don't more dental practitioners work in rural areas?

What do you think would encourage more dental practitioners to work in rural areas?

During your training course to become a dental practitioner, did you participate in a rural placement programme?

If yes, where, and please share with me your experience there. What were the positive/negative aspects of it?

Have you ever worked in a rural area(s)?

If yes,

What is the postcode(s)/locality (town, state)?

What made you move to that area?

How long did you stay there?

What made you leave the area?

If no,

Why not?

What factors would influence your decisions to work in a rural area?

What factors would influence your decisions to leave a rural area?

What factors would influence your decision to stay for an extended period?

What can the Government/s and universities or others do to encourage dental practitioners move to, and stay in a rural area?

Do you have any other comments or suggestions?

About you

Where were you born? (Name of town/postcode and state)

What is your residential status?

Where did you attend the last two years of schooling before entering dental school?

What is your relationship status?

What is your age in years?

Where did you first train as a dental practitioner?

What year did you first register as a dental practitioner?

Where is your main place of practice?

How long have you been at your current place of practice? (<5 years or >5 years)

What is the postcode of your current main place of practice?

Do you work part-time or full-time?

What are the main reasons you chose to study to become a dental practitioner?

Do you have any HECS or other student debt?

What are your favourite aspects of practicing dentistry? What procedures do you particularly enjoy/dislike?

Appendix G. **Information sheet for survey participants**

University of Tasmania

Private Bag 103, Hobart, Tasmania,
Australia, 7001

Dental Practitioners: Rural Work Movements

You are invited to participate in a research study into the attitudes of dental practitioners to working in rural areas of Australia.

This study is being conducted by the Centre of Research Excellence in Primary Oral Health Care based at the University of Tasmania, Department of Rural Health by Dr Len Crocombe, A/Prof Erica Bell, Dr Ha Hoang, and Mrs Diana Godwin.

What is the purpose of this study?

It aims to discover the attitudes of Australian dental practitioners towards living and working in rural areas. The study will provide recommendations for policy makers and other stakeholders regarding recruitment and retention strategies for the Australian rural dental workforce.

Why have you been invited to participate?

You have been invited to participate in this study because you are an Australian-registered dental practitioner. Your input is vital.

What does this study involve?

You will be asked to complete a survey questionnaire which will take you about 10-15 minutes.

The survey questionnaire includes five parts: Part A asks about your background; Part B asks you about factors influencing your decisions to move to a rural area; Part C about factors

influencing your decisions to leave a rural area; Part D about factors influencing your decisions to stay in a rural area and part E about your own comments.

Once completed, send your completed questionnaire back in the postage paid envelope provided.

All interview data used in this study will be kept in a locked and secure filing cabinet and on password protected computers in the University of Tasmania, Department of Rural Health. The data will be destroyed five [5] years after completion of the study.

Possible benefits from participation in this study?

This study will:

Influence future government policies and initiatives relating to increasing the number of dental professionals working in underserved rural areas in Australia;

Improve dental school and university student placements and incentives to encourage dental professionals and students to work in and remain working in rural and remote areas after graduation;

Address perceived issues related to social isolation and community involvement; and

Improve access to dental care for rural and remote areas.

Possible risks from participation in this study?

The study is designed to explore your views/attitudes towards and/or experiences of working and living in rural areas. It is unlikely that the study will recall painful memories as it is a broad study of workforce issues. However, this is always a minor risk when recalling any experience. Your participation in the study will help achieve many benefits as outlined above.

Anonymity and Confidentiality

Participation in this study is voluntary and any research data gathered during this study will be kept confidential. Any information you supply will not identify you as a participant.

How will the results of the study be published?

This research project is being conducted in partial fulfilment of a PhD for Diana Godwin and is being supervised by A/Prof Bell, and Dr Crocombe and Dr Hoang from the University Department of Rural Health at the University of Tasmania. The research will be published in a PhD thesis, in conferences and in peer-reviewed journals and will be available through the University of Tasmania, Department of Rural Health.

What if I have questions about this study?

If you would like to discuss any aspect of this study please feel free to contact Mrs Diana Godwin via email: diana.godwin@utas.edu.au or by phone: (03) 6226 7798.

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee (HREC). If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on (03) 6226 7479 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Please quote ethics reference number [Hxxxxx].

If you agree to participate, please sign the attached consent form and return it to us in the stamped and addressed envelope.

Thank you for taking the time to consider this study. You may keep this information sheet.

Appendix H. **Survey questionnaire original submission**

University of Tasmania

Private Bag 103, Hobart, Tasmania,
Australia, 7001

Dental Practitioners: Rural Work Movements

Thank you for your interest in our survey which is designed to investigate the attitudes, barriers and enablers of Australian dental practitioners towards living and working in rural areas.

This study will influence future government policies and initiatives relating to increasing the number of dental professionals working in underserved rural areas in Australia and consequently improve the oral health and general health of people living in rural and remote areas.

We are asking different types of Australian dental practitioners to complete our survey to give us an understanding of the motivational factors which influence current and future dental practitioners to move to, stay in and move away from rural areas. The more people participating in the survey, the more representative the survey results will be.

This survey will take 10-15 minutes to complete.

This survey is completely anonymous. We don't collect any information that can identify you, such as names or addresses.

You can stop the survey at any time if you don't feel comfortable answering the questions. Any information you have provided up to that point will not be used in the results.

Please return the survey within 2 weeks of receiving it.

If you have any queries about the survey or the results, please contact Diana Godwin on diana.godwin@utas.edu.au or (03) 6226 7798.

Appendix I. **Questionnaire final submission**

Part A: About you

What is your sex?

☐ Male

☐ Female

Where is your place of birth?

☐ Australia (please specify your Town and State): _____

☐ Other (please specify): _____

What is your residential status?

☐ Australian citizen

☐ Permanent resident

☐ Temporary resident

Where did you attend for last two years of schooling before entering your dental course?

☐ Australia (please specify the Town and State): _____

☐ Overseas urban area

☐ Overseas rural area

☐ Other (please specify): _____

What is your family status?

☐ Single

☐ Single with child(ren)

☐ In a relationship with child(ren)

☐ In a relationship with no child(ren)

☐ Other (please specify): _____

What is your profession?

☐ Dentist

☐ Dental specialist (please specify your speciality):
_____

☐ Dental hygienist

☐ Endodontics

☐ Dental therapist

☐ Oral health therapist

☐ Dental prosthetists

☐ Other (please specify): _____

What is your age group?

☐ 20 – 34

☐ 35 – 44

☐ 45 – 54

☐ 55 - 64

☐ 65 - 74

☐ 75+

Where is your main place of practice?

☐ Hospital

☐ Community health centre

☐ Private practice

☐ Government service [includes Defence]

☐ University, teaching, research

☐ Other (please specify): _____

How long have you been in your current main place of practice?

☐ Less than 5 years

☐ 5+ years

What is the postcode of your main place of practice?

☐☐☐☐

What are the usual number of hours you work per week?

☐ Part-time (35 hours per week or less)

☐ Full-time (35+ hours per week)

☐ Other (please specify): _____

Do you have any educational or HECS (Higher Education Contribution Scheme) debt?

☐ No

☐ Yes

Did you participate in any rural placement while you were doing your dental training?

☐ No

☐ Yes

Have you ever worked as a dental practitioner in a rural area?

☐ No

☐ Yes

Part B: Factors influencing your decisions to move to a rural area

Please rate the importance of factors that could affect your decision to move to a rural area by ticking (✓) the most appropriate box for each of the following items.

Factor	Very important	Important	Neutral	Unimportant	Not at all important
Income potential/attractive salary package	☐	☐	☐	☐	☐
Financial incentives	☐	☐	☐	☐	☐
Desire to work in an underserved area	☐	☐	☐	☐	☐

Chance to set up a private practice	☐	☐	☐	☐	☐
Limited suitable work opportunities elsewhere	☐	☐	☐	☐	☐
Chance to work in a multidisciplinary team	☐	☐	☐	☐	☐
Close relationships with clients	☐	☐	☐	☐	☐
Positive prior work experience in a rural area	☐	☐	☐	☐	☐
Chance to utilise a wider range of skills	☐	☐	☐	☐	☐
Chance for self-career development	☐	☐	☐	☐	☐
Chance to return to the place of previous clinical placement	☐	☐	☐	☐	☐
Chance to return to hometown	☐	☐	☐	☐	☐
Existing social networks in a rural area	☐	☐	☐	☐	☐
Close to extended family	☐	☐	☐	☐	☐
Desire to live in a certain geographic region	☐	☐	☐	☐	☐
Affordable cost of living in the area	☐	☐	☐	☐	☐
Multicultural community	☐	☐	☐	☐	☐
A good place to raise children	☐	☐	☐	☐	☐
Affordable housing	☐	☐	☐	☐	☐
Employment opportunities for spouse/partner	☐	☐	☐	☐	☐
Desire for rural lifestyle	☐	☐	☐	☐	☐
Chance to experience a new place	☐	☐	☐	☐	☐

Part C: Factors influencing your decisions to leave a rural area

Please rate the importance of factors that could affect your decision to leave a rural area by ticking (✓) the most appropriate box for each of the following items.

Factor	Very important	Important	Neutral	Unimportant	Not at all important
Limited opportunities for professional development	☐	☐	☐	☐	☐
Long working hours	☐	☐	☐	☐	☐
Inadequate supervision	☐	☐	☐	☐	☐
Poor working conditions	☐	☐	☐	☐	☐
Inadequate income	☐	☐	☐	☐	☐
Inadequate financial incentives	☐	☐	☐	☐	☐
Lack of locums	☐	☐	☐	☐	☐
Professional isolation	☐	☐	☐	☐	☐
Concern about de-skilling	☐	☐	☐	☐	☐
Job expectations not meeting reality	☐	☐	☐	☐	☐
Intend to undertake further study	☐	☐	☐	☐	☐
Difficulties in recruiting private practice staff	☐	☐	☐	☐	☐
Heavy work load	☐	☐	☐	☐	☐
Professional/personal differences with colleagues	☐	☐	☐	☐	☐
On call duties	☐	☐	☐	☐	☐
Job offered elsewhere	☐	☐	☐	☐	☐
Regulations that restrict the range of procedures able to be provided	☐	☐	☐	☐	☐

Transport issues-too far from everywhere else	☐	☐	☐	☐	☐
Personal isolation	☐	☐	☐	☐	☐
Lack of work opportunities for spouse/partner	☐	☐	☐	☐	☐
Fear of increased professional risk-including litigation and/or grievances	☐	☐	☐	☐	☐
Spouse/partner's career	☐	☐	☐	☐	☐
Lack of community connectedness	☐	☐	☐	☐	☐
Education for child(ren)	☐	☐	☐	☐	☐

Part D: Factors influencing your decisions to stay in a rural area

Please rate the importance of factors that could affect your decision to stay in a rural area by ticking (✓) the most appropriate box for each of the following items.

Factor	Very Important	Important	Neutral	Unimportant	Not at all important
Good teamwork	☐	☐	☐	☐	☐
Flexible working hours	☐	☐	☐	☐	☐
Financial incentives	☐	☐	☐	☐	☐
Income	☐	☐	☐	☐	☐
Rural lifestyle	☐	☐	☐	☐	☐
Sense of belonging to the community	☐	☐	☐	☐	☐
Sense of being valued	☐	☐	☐	☐	☐
Working conditions	☐	☐	☐	☐	☐
The contentedness of family members	☐	☐	☐	☐	☐
Professional autonomy	☐	☐	☐	☐	☐

Part E: Your own comments

What can the Government/s and other stakeholders do to encourage dental practitioners to move to and stay in rural areas?

……

……

……

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……

……

Please share with us your comments or suggestions for improving recruitment and retention of the Australian rural dental workforce.

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……

Thank you for completing the survey. Your contribution is greatly valued.

Please return this questionnaire in the enclosed reply-paid envelope addressed to:
Dental Practitioner Workforce Movements Survey
University Department of Rural Health,
The University of Tasmania,
Private Bag 103, Hobart, Tasmania, 7000

Appendix J. **Ethics Application**

Tasmania
Explore the possibilities

HUMAN RESEARCH ETHICS COMMITTEE
(TASMANIA) NETWORK

UTAS

SOCIAL SCIENCE HREC
MINIMAL RISK APPLICATION

Important: Please send an electronic version of this form as a Word document along with all attachments to katherine.shaw@utas.edu.au.
A signed copy of this form also needs to be forwarded electronically.

If you have any questions, please call: 6226 2763

1. Title of proposed investigation
Please be concise but specific. Titles should be consistent with those used on any external funding application. Dental Practitioners: Rural Work Movements

2. Expected commencement date:	Expected completion date of project
08/05/2013	08/02/2016

3. Investigators:

A. Chief Investigator (Note: This is the researcher with ultimate responsibility for the project. The CI may not be a student)

Given Name	Surname
Leonard	Crocombe

Staff Position:	Senior Research Fellow	**Qualifications:**	BDSc, MBA, MPA, PhD, Grad Cert Ed (Higher Ed), Grad Cert Dent, FICD, FADI, FCHSM
Staff ID:	02462166		
School & Division:	University Department of Rural Health, Faculty of Health Science		
Contact Address:	University Department of Rural Health, University of Tasmania Private Bag 103, Hobart, Tasmania, 7001		
Telephone:	03 6226 7798, 0419 597 756	**Email:**	Leonard.Crocombe@utas.edu.au

(Required)

B. Co-Investigator(s)

i) Given Name	Surname
Erica	Bell

Staff Position: Deputy Director
Qualifications: PhD, MA (Qual), BA

Staff ID: 02297209

Contact Address: University Department of Rural Health, University of Tasmania
Private Bag 103, Hobart, Tasmania, 7001

Telephone: 03 6226 7377
Email: Erica.Bell@utas.edu.au
(Required)

ii) Given Name	Surname
Ha	Hoang

Staff Position: Postdoctoral Fellow
Qualifications: PhD, MMSc, B Sea Transport Economics, Grad Cert Research Commercialisation, Grad Cert Banking & Finance

Staff ID: 02392759

Contact Address: University Department of Rural Health, University of Tasmania
Locked Bag 1372, Launceston, 7250

Telephone: 03 6324 4031
Email: Thi.Hoang@utas.edu.au
(Required)

iii) Given Name	Surname
Diana	Godwin

Staff Position: Research Assistant and forthcoming PhD candidate as of mid-2013
Qualifications: BA, BEc

Staff ID: 02543645

Contact Address: University Department of Rural Health, University of Tasmania
Private Bag 103, Hobart, Tasmania, 7001

Telephone: 03 6226 7798
Email: Diana.Godwin@utas.edu.au

(Required)

C. Student Investigator(s):

i) Given Name Surname

Gender: _____ Date of Birth: _____ Preferred Title:
Mr / Ms / Miss /Mrs /Dr

Student Number: _____ Level:
Undergraduate / Hons / Masters /
School: _____ Postgraduate Diploma / PhD

Contact Address: _____

Telephone: _____ Email: _____
(Required)

ii) Given Name Surname

Gender: _____ Date of Birth: _____ Preferred Title:
Mr / Ms / Miss /Mrs /Dr

Student Number: _____ Level:
Undergraduate / Hons / Masters /
School: _____ Postgraduate Diploma / PhD

Contact Address: _____

Telephone: _____ Email: _____
(Required)

4. Purpose

What is the main purpose of this project?

Research for Publication ☒ Teaching ☐
Research for Thesis ☐ Quality Assurance/Audit ☐

5. Brief Outline of Proposal

Aims:

Please give a concise description of the main objectives and/or hypothesis of the study.

To investigate the attitudes, barriers and enablers of Australian dental practitioners towards living and working in rural areas.

Justification:

Explain why this particular study is worth doing; and the main advantages to be gained from it.

Oral health is fundamental to overall health, wellbeing and quality of life. The impact of oral disease on people's everyday lives is subtle and pervasive, influencing eating, sleeping, work and social roles (Australian Health Ministers' Conference, 2004). People from outside the Australian capital cities are more likely than their city counterparts to have poor oral health (Roberts-Thomson & Do, 2007). The reasons for this are complex involving factors such as fluoride exposure (National Health and Medical Research Council, 2007), age (Steele et al., 2004) , socioeconomic status (Sanders et al. 2006; Sanders & Spencer, 2004) and a differing attitude to health (Humphreys et al. 2002), but it is exacerbated by poorer access to dental care (Crocombe et al. 2012). In Australia, there is an uneven distribution of dentists towards larger centres (Teusner et al. 2007); a regional unequal distribution that is increasing (Balasubramanian & Teusner, 2011). Particularly, the number of dentists per 100,000 population ranges from only 27.3 in remote areas to 70.7 in major cities (Australian Institute of Health and Welfare, 2013). This is in part due to difficulties in attracting and retaining dental practitioners to rural practice.

The factors influencing the recruitment and retention of health professionals in rural and remote areas have attracted much attention from academic literature (Kruger & Tennant, 2005; Lenthall et al. 2011). Rural background and undertaking rural placements have been consistently found to be associated with both recruitment and retention of health professionals to rural areas (Daniels et al. 2007; Eley et al., 2007; Laven et al. 2003; Lea & Cruickshank, 2005; Richards et al. 2005; Schoo et al. 2005; Woloschuk & Tarrant, 2004), as have financial incentives (Daniels et al. 2007; Hall et al. 2007) and the rural life style (Brooks et al. 2002; Kruger & Tennant, 2005; Manahan et al. 2009).

The literature also provides evidence on the factors influencing health professionals' decisions to leave a rural area. These include the lack of continuing professional development opportunities and limited career pathways contribute to the decisions of health professionals to leave their jobs (Dussault & Franceschini, 2006; Hall, et al., 2007; Schoo, et al., 2005), the organisational environment such as stress, lack of locum relief and/or qualified assistants, workload, inflexible working hours, poor quality work environment, lack of organisational support (Alexander & Fraser, 2001; Humphreys et al. 2002; MacIsaac et al. 2000), and the needs of other family members such as limited educational opportunities for children (Kruger & Tennant, 2005; MacIsaac et al., 2000).

Although there is a significant body of research conducted in Australia and overseas to determine the factors influencing the recruitment and retention of the health workforce in underserved areas, the main focus is on the medical workforce. Information about dental practitioners' choice to work and live in rural areas is very limited. Consequently, strategies and policy interventions to attract dental professionals to rural locations have usually been based on policies used to attract medical professionals to rural areas. For example, the Commonwealth Government has recently announced a Rural and Remote Infrastructure and Relocation Grants

Program for Dentists to provide scaled relocation grants and infrastructure grants to encourage dentists to relocate to regional, rural and remote areas. It has also announced the Nursing and Allied Health Rural Locum Scheme program (Department of Health and Ageing, 2011) designed to support nurses, midwives and allied health professionals in rural and remote Australia to take leave to access the professional development training. Whether using the same incentives to encourage dental practitioners to rural areas as used for medical practitioners will work is unknown.

In addition to the context as discussed above, as the demand for dental services grows in response to the ageing population of Australia, competition for dental professionals tends to become more critical, especially for more remote areas (Hall et al. 2007). This may affect the dental health of people in these areas who are generally older and poorer than their urban counterparts and often have less health insurance coverage (Healy et al. 2006). Thus, understanding what may attract dental practitioners to a rural/regional community, and why they may remain and leave, is vital for developing effective strategies to address the unequal distribution of the dental workforce. To date, in Australia there are only a few study investigating these issues and involving small sample sizes of dental practitioners. Therefore, there is a gap for this study to contribute to the field. This study seeks to discover the attitudes, barriers and enablers of Australian dental practitioners towards living and working in rural areas. It is expected that the findings of the study will provide implications and recommendations for policy makers and other stakeholders regarding recruitment and retention strategies for the rural dental workforce.

6. Review of Ethical Considerations

Research is only considered to be Minimal Risk if you answer "No" to all the following questions. If you answer "Yes", you must complete a full application using the Social Sciences Full Application Form

Does your research involve the collection of human tissue samples? Human tissue samples include blood and other bodily fluids.	Yes ☐ No ☒
Does your research involve the deception of participants, including concealing the purposes of research, covert observation and/or audio or visual recording without consent?	Yes ☐ No ☒
Does your research involve the participation of people without their prior consent?	Yes ☐ No ☒
Does your research involve withholding from one group specific treatments or methods of learning from which they may benefit?	Yes ☐ No ☒

Does your research involve the access or use of medical records where participants can be identified or linked to their records in some way?	Yes ☐ No ☒
Does your research involve the use of ionising radiation?	Yes ☐ No ☒
Does your research involve the use of personal data obtained from a Commonwealth or State Government Department/Agency without the consent of the participants e.g. getting a list of addresses from the Australian Electoral Commission?	Yes ☐ No ☒
Does your research **specifically target** any of the following groups of people; (specifically target means they are the central group of participants, as opposed to potentially being incidentally recruited as part of the general population) • Women who are pregnant and the human foetus • Children and young people • Those highly dependent on medical care who are unable to give consent • People with a cognitive impairment, intellectual disability or mental illness • People who may be involved in illegal activities or residents of custodial institutions • Aboriginal and Torres Strait Islander Peoples • People in other countries • People who are unable to give informed consent because of difficulties in understanding an information sheet (i.e. non English speakers etc)	Yes ☐ No ☒
Does your research pose any risks for participants under medical care beyond those of their routine care? (Risks include not only physical risks but also psychological, spiritual and social harm or distress eg stigmatisation or discrimination)	Yes ☐ No ☒
Does your research involve the in depth discussion of any of the following topics whether by interview or as part of a questionnaire or survey; • Parenting practices, • Sensitive personal issues, • Sensitive cultural issues, • Grief death or serious traumatic loss, • Depression mood states or anxiety, • Gambling,	Yes ☐ No ☒

• Eating disorders, • Illicit drug taking or substance abuse, • Psychological disorders, • Suicide, • Gender identity and/or sexuality, • Race and/or ethnic identity, • Fertility and/or termination of pregnancy	
Does your research involve the potential disclosure of illegal activities or criminal behaviour?	Yes ☐ No ☒
Are there any specific risks to the researcher (e.g., will the research involve the use of hazardous materials or be undertaken in a politically unstable area)?	Yes ☐ No ☒
If your research will take place in an overseas setting do any of the following apply: is the research to be undertaken in a politically unstable area? Does it involve sensitive cultural issues? And/or: will the research take place in a country in which criticism of the government and institutions might put participants and/or researchers at risk?	Yes ☐ No ☒
Does your research explore potentially confidential business practices or seek to elicit potentially confidential commercial information from participants?	Yes ☐ No ☒
Does your research explore potentially divergent political views or involve the collection of politically sensitive information?	Yes ☐ No ☒

7. FUNDING

Under the National Statement (2.2.6) a researcher must disclose:

- *the amount and sources or potential sources of funding for the research; and*
- *financial or other relevant declarations of interest of researchers, sponsors or institutions*

Is this research being funded? Yes ☒ No ☐	
If yes, please detail amount and source of funds (NS 5.2.7)	$2.5 million over 4 years
If this application relates to Grant(s) and/or Consultancies, please indicate the Title and Grant Number relating to it	APHCRI Centre of Research Excellence In Primary Oral Health Care

If no external funding has been obtained, please indicate how any costs of research will be met:

Do the investigators have any financial interest in this project? Yes ☐ No ☒

If yes, please provide details

8. Participants

Selection of Participants

Clearly describe the experimental and, where relevant, control groups. Include details of number of subjects, sex, age range, and any special characteristics. Give a justification for your choice of participant group(s).

Number of participants: approx. 3050 participants

Interview

Sample size: approx. 50 dental practitioners

Self-administered survey

Sample size: approx. 3000 dental practitioners

The results from a control group of city-based dental practitioners will be compared with the results from rurally based dental practitioners.

1. **Sex**

- Male and female – A sample of dental practitioners will include both male and female participants.
- Males and females may have different attitudes to living and practicing their profession in rural areas.

2. **Age range**

- As the main participants of the study are dental practitioners, they must be over 18 years of age to participate in the study.
- Different age groups may have different attitudes to living and practicing their profession in rural areas.

3. **Type of dental practitioner**

- Dental specialist, dentist, dental hygienist, dental therapist, dental prosthetists, oral health therapist.
- Different dental practitioners may have different attitudes to living and practicing their profession in rural areas.

4. **Place of training**

- Overseas trained dental practitioners may have different attitudes to working in rural areas
- Recent Australian-based rurally-placed dental training programs claim students who have rural experience are more likely to practice in rural areas after graduation, this premise requires testing.

Recruitment of Participants

Give specific details about how participants will be recruited. Some questions to consider include:

- *Are you recruiting through advertisements? If so, indicate where they will be placed and append a copy*
- *Are you recruiting through 3rd parties like associations, schools or clubs? If so, detail how you will approach the organisations and the process that the stakeholders will use to pass on information to potential participants. Please attach copies of letters of introduction, emails, and telephone preambles if appropriate*
- *Are the participants University or DHHS staff, or regular patients in a particular clinic? If so, detail how they will be approached i.e. through personal invitation, email etc*

Interview

Third parties including Australian Dental Association (ADA), Dental Hygienist Association of Australia (DHAA), Australian Dental and Oral Health Therapist Association (ADOHTA), and the Australian Dental Prosthetists Association (ADPA) will be approached for their support for the study. With their approval and support, a sample of 50 dental practitioners will be recruited through advertisements placed in these organisations' websites and/or newsletters.
Please refer to

Attachment 1: Invitation letter to third parties
Attachment 2: Advertisement for recruiting interview participants
Attachment 3: Information sheet (interview participants)
Attachment 4: Consent form (interview)
Attachment 5: Interview questions

Self-Administered Survey

Third parties (ADA, DHAA, ADOHTA, ADPA) will be approached for their support for the self-administered survey component of the study. With their permission and support, the survey questionnaire will be made available in hard copies to dental practitioners who are the members of or known by these third parties. This may include reception areas and members' pigeon holes or via email. An independent researcher, who will not be involved with the research project in any other way, will be made available to liaise with the third parties to aid with stratification of the survey and with follow up of non-respondents.
A specially printed outer envelope will denote that it is the 'Dental Practitioners: Rural Work Movements' survey. There will be an envelope containing the information sheet, a copy of questionnaire and a reply paid envelope addressed to University Department of Rural Health. There will be provision on the back of the envelope for name and address of participants returning the questionnaire. The envelope will be immediately separated from the survey form by the independent consultant and stored elsewhere and only used for follow-up purposes. There will not be any way that the survey data will be able to be linked back to the questionnaire.
Please note that the survey questions will have to be changed as a result of the interview outcomes and to put them into a discrete choice experiment format. This will be done in consultation with A/Prof Emily Lancsar, an associate investigator with the Centre of Research

Excellence in Primary Oral Health Care and an Associate Professor at the Centre of Health Economics at Monash University. At the appropriate time, the researchers will resubmit the updated questionnaire to the HREC.

Please refer to: Attachment 1: Invitation letter to third parties
Attachment 6: Information sheet (survey participants)
Attachment 7: Survey questionnaire.

9. Data Identifiability

Which of the following best describes the identifiability of the data (including tissues) collected?

a) Non-identifiable data is data which have never been labelled with individual identifiers or from which identifiers have been permanently removed, and by means of which no specific individual can be identified. A subset of non-identifiable data are those that can be linked with other data so it can be known that they are about the same data subject, but the person's identity remains unknown. ☐

b) Re-Identifiable data is data from which identifiers have been removed and replaced by a code, but it remains possible to re-identify a specific individual by, for example, using the code or linking different data sets ☒

c) Identifiable data is data where the identity of a specific individual can reasonable be ascertained. Examples of identifiers include the individuals name, image, date of birth or address, positions in some companies. ☐

If the information is Re-Identifiable or Identifiable, please give details of the information that will be collected. Also indicate how the confidentiality and anonymity of the participants will be protected:

The respondents will re-identifiable only to ensure follow ups of non-respondents to the survey questionnaire. This will be done via a liaison with the dental professional associations by an independent (to the researchers) consultant and the process will ensure that the confidentiality and anonymity of the participants' responses to the survey is protected.

10. Relevant Literature References

Please list the most relevant and recent literature references, both by the investigator and/or by others, that support the justification for the study.

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11. Procedures

Researchers should explain how the investigators intend to conduct the study including the methodological approach, the specific procedures employed and the methods of analysis of data. This should be consistent with the aims of the project.

Please provide detailed procedures (describe exactly what you are going to do):

A systematic review of the publically available literature on the recruitment and retention of the health workforce in rural and remote areas of Australia and relevance to oral health is being undertaken. Australian strategies are being compared with overseas strategies and analysed to identify factors associated with workforce maldistribution and strategies that have proved effective in addressing such shortages.

The methodology will involve two stages:

Interview

The researchers will contact the professional associations and universities with dental programs for their support for the study. Once they agree to participate in the study, a sample of 50 dental practitioners will be recruited for interviews as "key informants" through advertisement in professional journals and newsletters.

Selection criteria for interview participants

- over 18 years old; and
- Being a dental practitioner.

Interview participants will be asked why they would, or would not, practice in rural areas using a stratified sample to ensure it includes dental practitioners from different regional areas and remote/very remote settings, and from across the country.

Qualitative data from the interviews will be analysed using traditional thematic analysis approaches. Findings from the interviews and issues addressed in the literature will be used to design the survey.

Please refer to:

Attachment 1: Invitation letter to third parties
Attachment 2: Advertisement for recruiting interview participants
Attachment 3: Information sheet (interview participants)
Attachment 4: Consent form (interview)
Attachment 5: Interview questions.

Self- administered survey

A random, stratified sample will be used. The sample will be selected by the independent consultant to ensure that there are enough dental practitioners of various types with their main

location of practice from each of the Australian Bureau of Statistics postcode geographic classifications of major city, inner regional, outer regional, remote/very remote areas to gain statistically significant results. We have adopted the approach used by Laven et al (2003) who demonstrated that in order to ensure adequate statistical power and precise parameter estimates, a sample size of 400 practitioners per strata is required. Therefore, a sample of 1,600 will be required for the four strata of: major city, inner and outer regional, remote/very remote areas. The Australian Dental Association's (ADA) biennial mail dentist practice management surveys from 1961 to 2004 have had usable response rates of between 36-60%, with the response in 2001 being 46% (Barnard, 2011). Thus, a response rate of 50% was considered to be reasonable. Therefore, a sample of 3,200 will be required for this study.

Professional associations and universities with dental programs will be approached for their support to the study. With their permission and support, an independent researcher, who will not be involved with the research project in any other way, will be made available to assist with stratification of the survey and with the follow up of non-respondents. The survey questionnaire will be made available in hard copies to dental practitioners who are the members of or are known by these third parties. This may include reception areas and members' pigeon holes or via email. Reply-paid envelopes will be provided for the return of the survey.

Selection criteria for survey participants

- over 18 years old; and
- Being a dental practitioner.

Data from the questionnaires will be coded and entered into SPSS version 20.0. Descriptive statistics will be used and bivariate analyses will be undertaken to estimate crude effects of the variables on on the recruitment and retention of the health workforce in rural and remote areas and to identify putative confounders. Regression analysis will be used to adjust for multivariate-adjusted relationships.

Please refer to: Attachment 1: Invitation letter to third parties
Attachment 6: Information sheet (survey participants)
Attachment 7: Survey questionnaire.

Where is this project to be conducted? Researchers should attach a letter of agreement/support to participate from any organisation or department whose resources will be accessed as part of this project.

The study will recruit participants to participate in the study through Australian dental professional associations. An invitation letter which is to be sent to the professional associations is attached (Please see attachment 1). The project will be undertaken at the Hobart offices of the Centre of Research Excellence in Primary Oral Health Care at the University Department of Rural Health of the University of Tasmania.

12. Monitoring

What mechanisms do you intend to implement to monitor the conduct and progress of the research project? (NS 5.5)

The chief investigator (Dr Len Crocombe) will monitor the conduct and progress of the project. The researchers will conform to HREC reporting requirements as indicated in NS 5.5; will prepare a final report; and will immediately notify HREC of any adverse events.

13. Data Storage

All raw data (including blood and/or tissue) must be held by the responsible institution (i.e. UTas, DHHS, AMC) for a period of at least five (5) years from the date of the first publication (this includes publication of the thesis). The data may be kept for longer than five (5) years but must eventually be destroyed, unless explicit consent is obtained from the participants to archive their data.

Where will the data be kept?

Hard copy data will be stored in a locked, secure location at the Hobart offices of the Centre of Research Excellence in Primary Oral Health Care within the University of Tasmania Department of Rural Health for a period of five (5) years after publication. Electronic data will be stored in a restricted "UDRH research data archive" folder located on the FHS "S" drive under "Research", accessible only by the chief investigators.

How will the data be kept secure?

Access to this folder will be restricted to the designated Archives Officer for the Department and the Deputy Director (as research coordinator). The designated Archives Officer will establish and maintain a registry of projects for which data are held. Whilst in field, data will be secured by the researcher, and electronic data will be password protected.

How and when will the data be destroyed?

Data shall be destroyed by the designated Archives Officer after this five (5) year period. Hard copy materials will normally be shredded and re-cycled. Electronic data will be deleted from the secure servers of the Department of Rural Health after five years from the thesis submission.

Will any personal information be collected from sources other than the subjects themselves (Please refer to Privacy Legislation Section 95A - National Privacy Principles)?

No ☒ Yes ☐

If yes, please detail including a declaration of the sources of the Information i.e. medical records, databases, registries, lists of members from Associations, clubs etc:

Will data on individual subjects be obtained from any Commonwealth Government agency without seeking the consent of the individuals?

No ☒ Yes ☐

If yes, please detail including a declaration concerning which agency and what information is being sought. If you wish to obtain data containing personal information from any Commonwealth Government agency state the names of these agencies, describe the nature of this data and explain the justification for obtaining this information. At the Commonwealth level the collection, storage, use and disclosure of personal information by Commonwealth agencies is regulated by the Privacy Act 1988. The NHMRC requires the HREC to provide information on the cases in which it has approved access to, and use of, data held by Commonwealth Government agencies.

14. Information Sheet

With few exceptions, it is essential that subjects are provided with an information sheet about the study in which they are being asked to participate. The Chair of the HREC will pay close attention to the information that is given.

A copy of the proposed information sheet must be attached to your application form.

(*Information Sheet Pro forma is available on our website at:*

http://www.research.utas.edu.au/human_ethics/social_science_forms.htm)

Is your proposed Information sheet attached to this application?

Yes ☒ No ☐ (please provide an explanation as to why)

15. Consent Form

Written evidence of consent is usually required for research involving human subjects. If written consent is to be obtained a copy of the actual consent form that you propose to use. In certain circumstances, the HREC may give approval for consent to be waived (see Chapter 2.3 of the *National Statement*). While written consent is the norm, there are various kinds of studies for which other procedures for obtaining consent are more appropriate (See Chapter 2.2 of *National Statement*).

If you consider that written consent is inappropriate for this project please state your reasons clearly referring to the appropriate sections of the National Statement.

(*Consent Form Pro forma is available on our website at:*

http://www.research.utas.edu.au/human_ethics/social_science_forms.htm)

Is a proposed consent form attached to this application?

Yes ☒ No ☐

If no, please explain.

16. Approvals from other Departments / Institutions	
Does this project need the approval of any institution other than the University of Tasmania and/or the Department of Health and Human Services (e.g., Department of Education, particular wards in hospitals, prisons, government institutions, or businesses)? No ☒ Yes ☐ *If yes,* Please indicate below the Institutions involved and the status of the Approval. Name of Other Institution(s): Status:	
Does this project need the approval of any other HREC? *If yes,* Please indicate below which HREC and the status of the application.	No ☒ Yes ☐ (please detail): Other HREC(s): Status:

17. Declarations	
The Head of School or the Head of Department is required to sign the following statement of scientific merit: "This proposal has been considered and is sound with regard to its merit and methodology." The Head of School or Head of Department's signature on the application form indicates that he/she has read the application and confirms that it is sound with regard to: (i) educational and/or scientific merit and (ii) research design and methodology. This does not preclude the Committee from questioning the research merit or methodology of any proposed project. If the Head of School/Department is one of the investigators, this statement must be signed by an appropriate person. This may be the Head of School/Department in a related area or the Dean. The certification of scientific merit may not be given by an investigator on the project.	
Name	A/Prof Tony Barnett
Position	Director, University Department of Rural Health
Signature	
Date	17/04/2013

Conformity with NHMRC Guidelines

The *Chief Investigator* is required to sign the following statement:

I have read and understood the *National Statement on Ethical Conduct in Human Research 2007 and the Australian Code of Conduct for Responsible Research 2007*. I accept that I, as Chief Investigator, am responsible for ensuring that the investigation proposed in this form is conducted fully within the conditions laid down in the *National Statement* and any other conditions specified by the HREC.

Name of chief investigator	Dr Len Crocombe
Signature	
Date	17/04/2013

Signatures of Other Investigators

I acknowledge my involvement in the project and I accept the role of the above researcher as chief investigator of this study.

(Name) A/Prof Erica Bell	(Signature)	(Date) 17/04/2013
(Name) Dr Ha Hoang	(Signature)	(Date) 17/04/2013
(Name) Mrs Diana Godwin	(Signature)	(Date) 17/04/2013

CHECKLIST	
Please ensure that the following documents are included with your application:	
Information sheet/s (if not attached ensure you have explained why in Section 14)	☒
Consent form/s (if not attached ensure you have explained why in Section 15)	☒
Questionnaires (if applicable)	☒
Interview schedules (if applicable)	☒
A copy of any permissions obtained i.e. Other HREC, Other Institutions (if applicable)	☐
All documents relevant to the study, including all information provided to subjects.	☒
Telephone Preambles (if applicable)	☐
Recruitment Advertisements (if applicable)	☒

Email Contents (if applicable)	☐

TO SUBMIT THIS APPLICATION:

1. You must email an electronic copy of this application form (may be unsigned) and all study documents to Katherine.Shaw@utas.edu.au (please submit all forms as Microsoft Word documents).

2. A signed copy of this form also needs to be forwarded electronically.

Has the Head of School/Department signed the form? ☒

Have all investigators signed the form? ☒

Appendix K. **Ethics amendment forms**

Tasmania
Explore the possibilities

HUMAN RESEARCH ETHICS COMMITTEE
(TASMANIA) NETWORK

UTAS

SOCIAL SCIENCE HREC
AMENDMENT TO APPROVED PROJECT

This form should be completed to apply for amendments to all types of applications previously approved by the Social Science HREC.

Important: Please send an electronic version of this form as a Word document along with the attachments indicated below to katherine.shaw@utas.edu.au.
A signed copy of this form also needs to be forwarded electronically.

If you have any questions, please call: 6226 2763

Ethics Reference Number	H0013194	Date:	26/11/2014

1. Title of approved project
Dental Practitioners: Rural Work Movements

2. Investigator names	
Chief Investigator	Leonard Crocombe
Phone:	0419 597 756
Email:	Leonard.Crocombe@utas.edu.au
Other Investigator	Ha Hoang
Phone:	03 6324 4031
Email:	Thi.Hoang@utas.edu.au
Other Investigator	Diana Godwin
Phone:	03 6226 7798
Email:	Diana.Godwin@utas.edu.au

3. Requested changes to project

(These may include, for example, changes in procedure or direction of the project, changes to research personnel, changes in the source or manner of recruitment, or changes in the number of subjects.)

We request the following changes to the approved project:

- The inclusion of the final version of the survey questionnaire (attachment 7); and
- The survey will be administered electronically instead of hard copies.

4. Justification / reasons for the changes

Final version of the survey questionnaire (Attachment 7)

The survey has been updated with a current university letterhead, and the introductory paragraph has been revised and edited for clarity. In order to better serve the aims of the study and in response to the findings from the interviews which were the stage 1 of the study, the following changes have been made.

Questions 5, 12 and 16 have been added to the questionnaire.

Q5 will ask participants to outline where they went to university. This was a factor which was brought up in the interviews as an influential factors dependent on how rurally focused the dental curriculum was during their training.

Q12 will ask participants to distinguish the name of the township in which they spend the majority of their working time. This will help the researchers distinguish between postcode areas and town names. This is of particular help in rural and remote areas which share postcodes.

Q16 will ask participants whether they have ever considered working as a dental practitioner in a rural area. This information may influence their responses to the recruitment and retention factors.

Questions 4, 8, 9, 10, 11, 13, 14 and 15 have been reworded to minimise confusion and better help with understanding.

Sections B, C, and D have been edited for clarity. Parts C and D exchanged positions to make the survey flow better. The headings for sections B, C, and D have also been edited to explain the 'potential' and imaginative nature of the sections.

Comments sections have been added at the end of each table to provide participants with some blank spaces to write their comments. There were further edits and rewordings of the list of factors throughout sections B, C, and D.

Administration of the survey:
Originally we proposed to have hard copies of the survey sent out to a list of participants. However, in consultation with the third parties (the dental associations), they advised that an electronic survey would better suit their members and protect their privacy. The dental associations will help send out an email link to all of their members inviting them to participate in the survey. After a few weeks, an email reminder about the survey will be sent out again to encourage their member to participate.

5. Do the changes raise any ethical issues? Yes ☐ No ☒

If you answered 'YES', please identify these issues below:

6. Do the information sheet and/or consent form need to be changed? Yes ☐ No ☒
If you answered 'YES', please attach new information sheets and consent forms. Track changes must be used when making changes to previously approved documentation. Your amendment can not be assessed if Track Changes is not used.

7. Signatures:
Chief Investigator Name: Len Crocombe
Chief Investigator Signature:
Date: 26/11/2014

Appendix L. **Ethics approval forms**

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 2763
Fax: (03) 6228 7148
Katherine.Straw@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

UTAS

24 April 2013

Dr Leonard Crocombe
University Department of Rural Health
Private Bag 1 03

Sent via email

Dear Dr Crocombe

Re: MINIMAL RISK ETHICS APPLICATION APPROVAL
Ethics Ref: **H0013194 - Dental Practitioners: Rural Work Movements**

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 22 April 2013.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 7479 or human.ethics@utas.edu.au.

3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.

4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.

5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**

6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Katherine Shaw
Ethics Officer
Tasmanian Social Sciences HREC

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

Appendix M. **Ethics amendment approval forms**

Social Science Ethics Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 2763
Fax: (03) 6226 7148
Human.ethics@utas.edu.au

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

UTAS

1 December 2014

Assoc Prof Leonard Crocombe
Centre for Rural Health
Private Bag 34

Sent via email

Dear Assoc Prof Crocombe

Re: APPROVAL FOR AMENDMENT TO CURRENT PROJECT
Ethics Ref: **H0013194 - Dental Practitioners: Rural Work Movements**

- Final version of Survey Questionnaire (Attachment 7).
- Survey will be administered electronically rather than in hard copy.

We are pleased to advise that the Chair of the Tasmania Social Sciences Human Research Ethics Committee approved the Amendment to the above project on 29 November 2014.

Yours sincerely

Katherine Shaw
Executive Officer
Tasmania Social Sciences HREC